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M A J O R

R E M O T E C O N T R O L

P R E - S E L E C T I V E

*The
Control of
Sighting
in
Theaters*



S Y S T E M

Frank Adam Electric Co.
ST. LOUIS MISSOURI

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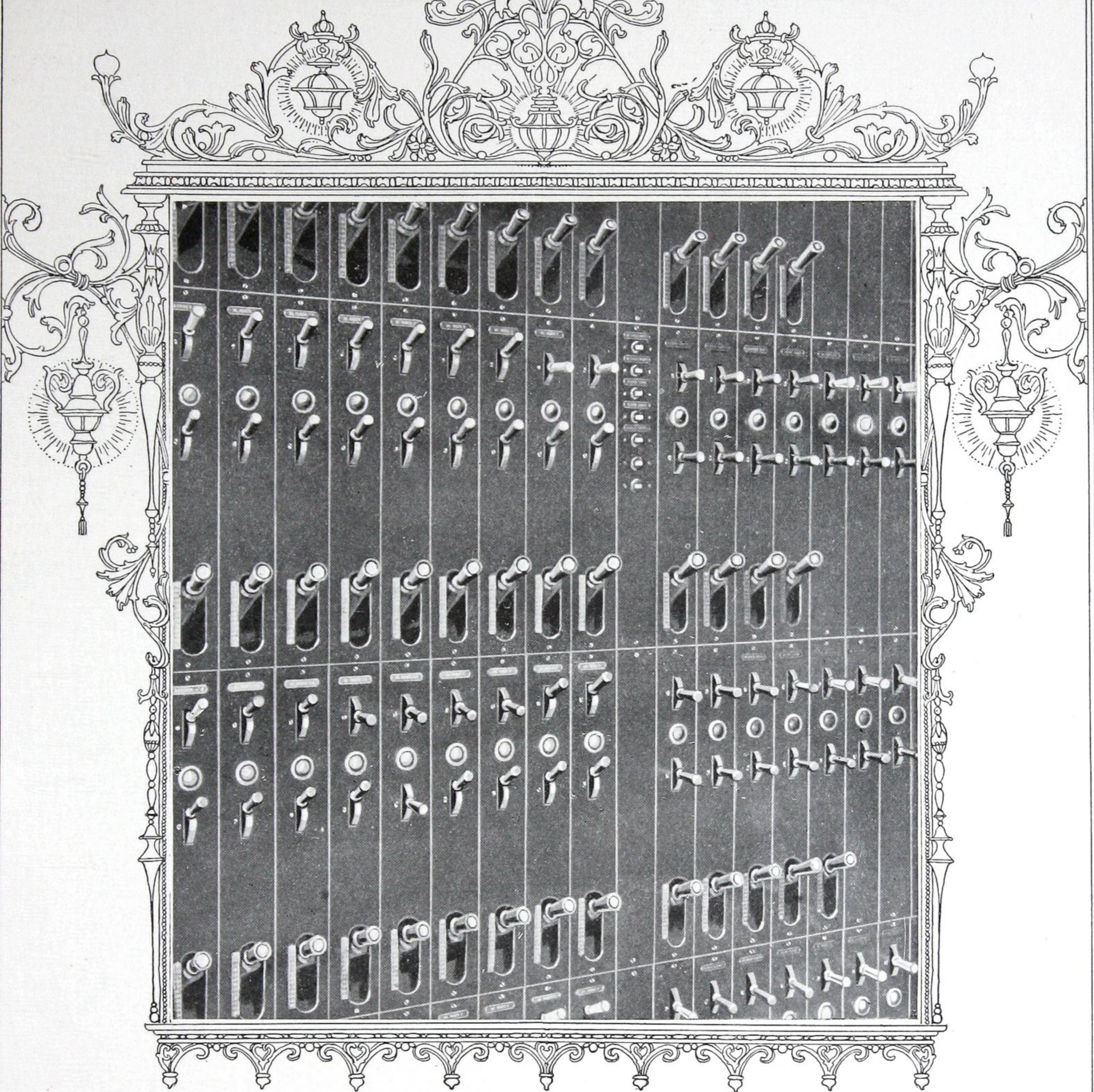


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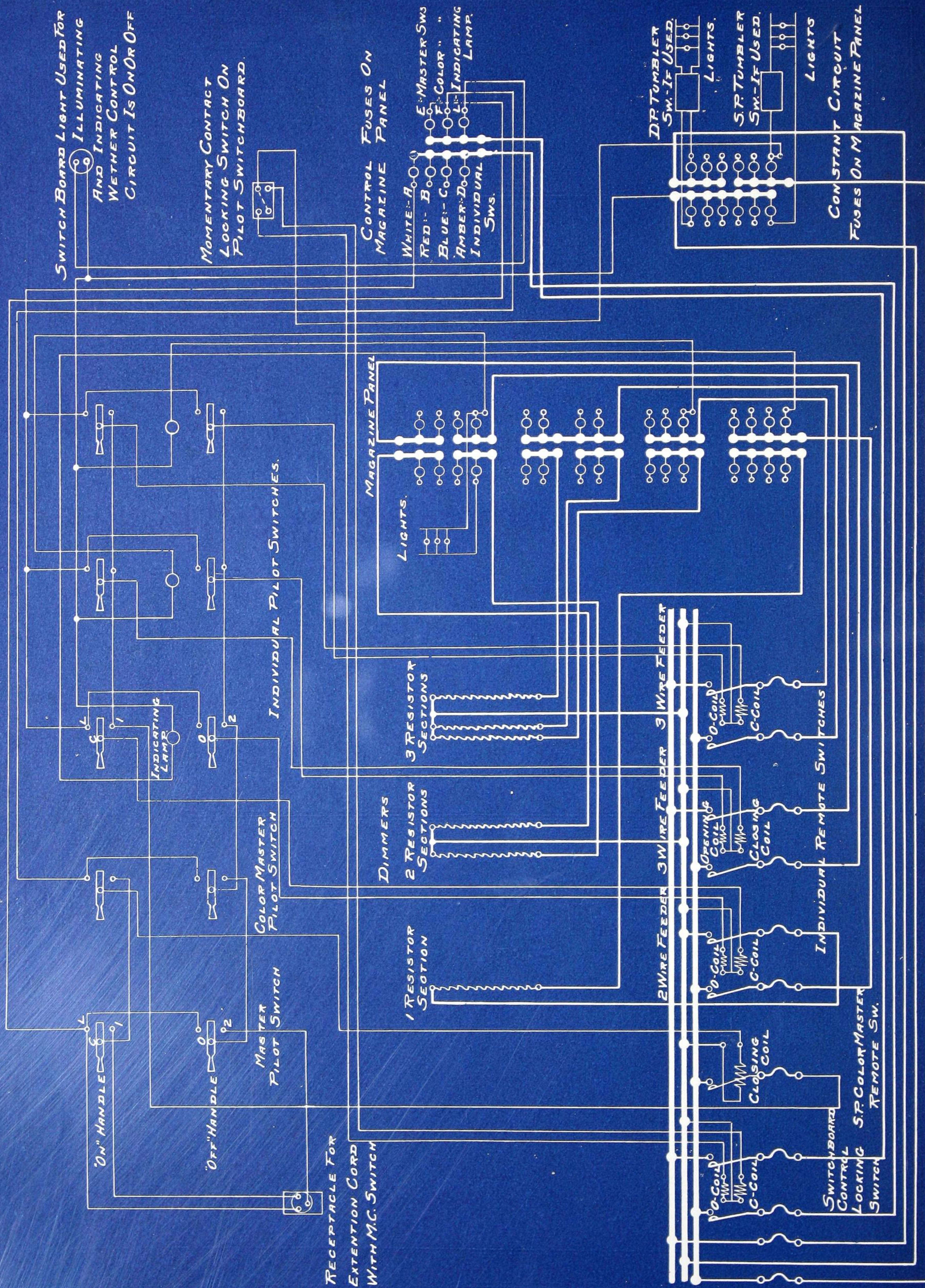
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The Control of Lighting in Theaters

Necessity, in a way, has produced the most of this book—for there has always been a great need for standardized practice, and greater effectiveness in stage and auditorium lighting. We want this book to be an aid to the appreciation and production of better lighting. We know full well that with widespread knowledge of correct theater and auditorium lighting will come the more thorough appreciation of the outstanding merits of the Major System of Theater Lighting Control.

Frank Adam Electric Co.
ST. LOUIS MISSOURI

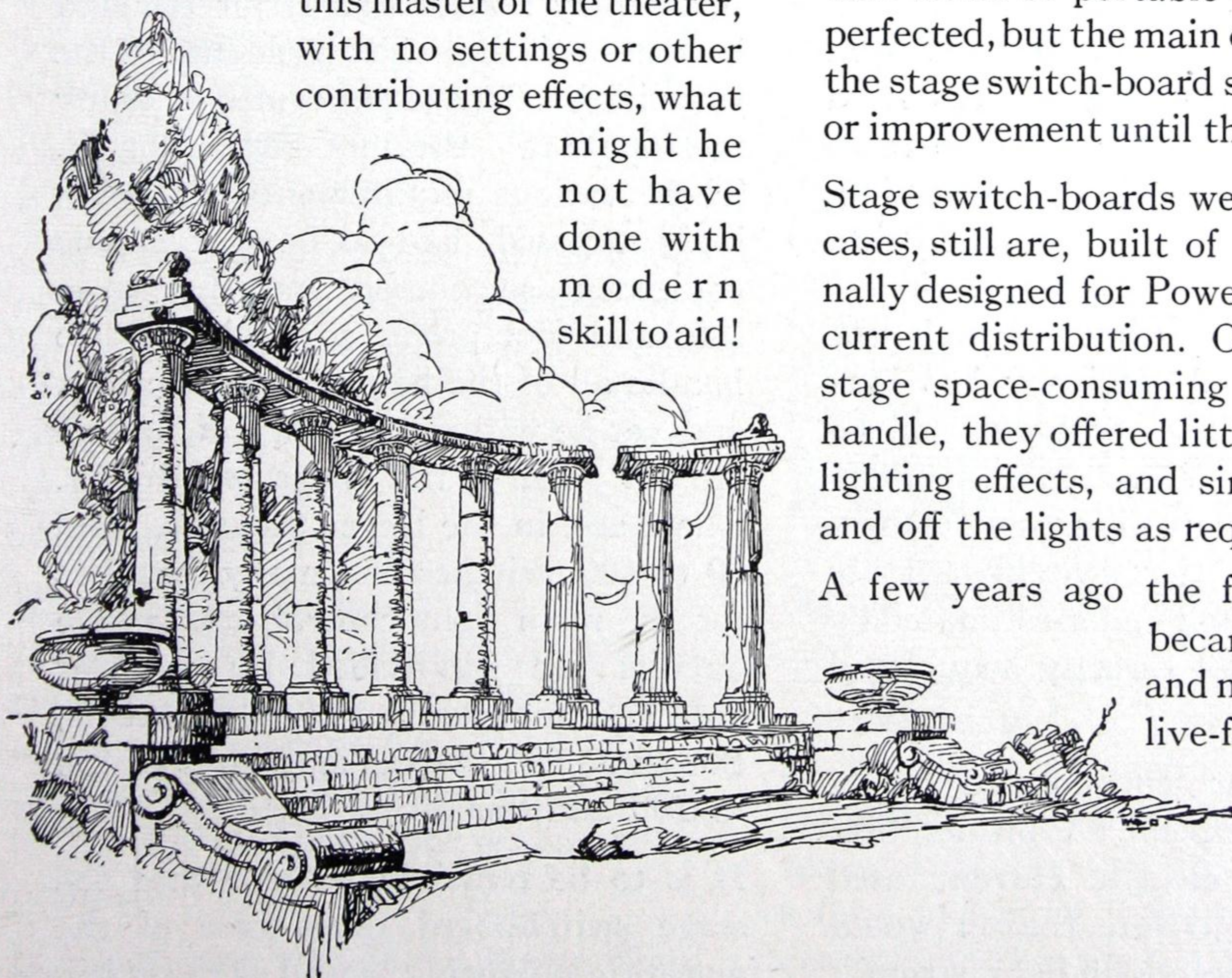


The Control of Lighting in Theaters

When Sophocles trod the stage of the open air theaters of ancient Greece, immortalizing human tragedies so that **Greek Theaters used daylight** they became the classics of all time, the use and control of light as an accessory to the drama, was unknown.

The realism of our day, its scenery, properties and costumes, had no place in the presentations of that early time. They are, in fact, the development of the last few centuries, only. Even Shakespeare relied mainly on the imagination of the audience to realize the significance of the actor's surroundings. Considering the success attained by this master of the theater, with no settings or other contributing effects, what

might he not have done with modern skill to aid!



It was in American plays that scenery, and therefore, light, found first usage in the theater. And as the Comedies, musical and spoken, began to supply a large part of theatrical entertainment, the use of scenery became recognized as a necessity. The present scenic marvels are indicative of the research and study devoted to this phase of theater history. The development of stage lighting equipment, for some unaccountable reason, practically stood still; the volume of light **Use of light advanced more rapidly than control apparatus** used on the stage increased enormously and certain items of portable equipment were perfected, but the main electrical device, the stage switch-board saw little change or improvement until the last ten years.

Stage switch-boards were, and, in rare cases, still are, built of materials originally designed for Power House electric current distribution. Open-knife type, stage space-consuming and clumsy to handle, they offered little aid to theater lighting effects, and simply turned on and off the lights as required.

A few years ago the factor of safety became an insistence and many other than live-face types were introduced. While these gave safety so far as the face of the board

was concerned, they intensified the awkwardness of control, and increased the occupied stage area.

About nine years ago, R. E. Major, a lighting engineer with actual experience as a theater electrician, invented and began his development of a remote control switchboard for stage lighting work.

With the aid of the Engineering Staff and manufacturing facilities of the Frank Adam Electric Company, the Major System was made a commercial possibility.

It was over six years ago that the first Major System was installed in the Illinois Theater, Chicago, replacing the old equipment with a saving of over 75% of the space alone. The Major System, designed for theater work exclusively by an engineer specializing in theater lighting, was a success from the start. There have been no basic changes since this first installation, though refinements have been added to further increase the efficiency. These minor changes continue though the point of practical efficiency has long been passed. The problems to be

Problems of theater lighting control solved in designing a really successful theater switchboard are many and are often under-estimated by those who are not directly acquainted with the work.

Volume is first encountered as a phase of the problem. Consider that the volume of electric current used daily in the up-to-date theater would supply a small town with light, so great

is the lighting demands for modern entertainment. The men interested in the many angles of theater activities have various exacting individual demands that electrical equipment must meet and, relatively, these demands are of conflicting nature. The *producer* insists that the electrical control be instantaneous, that it be highly flexible and absolutely dependable. The *owner* wants the cost of installation and equipment to be reasonable and expects it to give remarkable results. The *fire prevention and municipal authorities* insist that the safety of the public be first consideration.

The *Stage Manager* looks with favor on control boards which leave the greatest amount of space for scenery, properties and performers. Even in photo play houses this latter demand becomes a factor when prologues of the magnitude of those performed at many metropolitan theaters are staged. These various requirements, so seemingly opposed, had to be met in one equipment, so compact and efficient, so safe and fool proof, so flexible as to handle all of the heavy current easily, and yet be within the range of control of *one* man—the *stage electrician*. There are, in the larger theaters, from 60 to 100 switches and many dimmers for the main light control, and where circuits are subdivided by tumbler switches, into units for color effects, these smaller switches may number 150 to 200 additional.

It is to be remembered also that the stage switchboard takes care of the auditorium lighting as well as the stage.

Modern practice in film-play presentation of using the auditorium lights during the overture and prologue creates a peculiar demand on the control apparatus, for the stage electrician controls lights without seeing the effect he produces, and can only be guided by a pre-arranged program.

Practically all of the new theater palaces built for showing modern film drama are making a feature of marvelous light effects during their overture and prologue presentations. It is quite natural that if the ear is appealed to through the harmony of music and **Control of Auditorium lighting included** simultaneously the eye receives the harmony of light, the entertainment gains added pleasure and induces greater mental repose. This feeling produced, just prior to the feature play presentation, makes the film itself appear much more real, and the heightened entertainment increases the patronage of the house.

The installation cost of an adequate lighting control system practically pays for years of constantly varied entertainment. It actually costs only a trifle per week to have unusual lighting effects—since every theater must have some lighting anyway.

Many Major equipped theaters have attained a country-wide reputation because of their beautiful lighting—this factor, so strong that it creates coast-to-coast fame, has a value locally that is beyond computation in box-office profits.

It is only the thoughtful person who,

wandering into modern film palaces, visualizes behind the wondrous lighting and palatial decorations the hand of the artist and artisan. In contemplating the lighting in particular, few analyze the means by which hues of the rainbow sweep like the swiftly changing dawn through the gold domes of the auditorium. They feel the beauty of light and are thrilled or rested by the variance of color-play which seems to suggest the moods of the poet, but give only passing thought to the method employed.

How is it done? This magical manipulation of Vulcan's plaything! Who has the skill and courage to reproduce the rise and set of the Sun, the storms and sunshine of the changing seasons. What ingenious electro-mechanics are employed? Few care and fewer know—except the men who have given years of careful study to producing it, and the farsighted exhibitor who invests his money to bring this new source of enjoyment to his audiences.

It is accomplished by the Major System of Pre-Selective Remote Control. Like most great things, the perfection **Means more profit to theaters** which the Major System has attained is due to the careful working out of details to satisfy basic requirements.

The principal requirements for theater lighting control, as previously stated, are flexibility of handling, capacity for large load, minimum occupied stage space, reduction of fire hazard, and safety fool-proof apparatus. Heavy current switches are a source of danger

in theaters and meddlers around the stage switchboard must be guarded against.

These conditions are all met and many additional advantages gained by the Major System.

The Major Pre-Selective Remote System consists of a pilot board mounted on the stage operating a remote control board mounted in otherwise unoccupied space in the basement in a steel cabinet or a room where the floors, walls and ceiling are fireproof. It is this remote board located beyond sight and sound of the auditorium that performs the function of the switches of any other type of switchboard which is mounted on the stage.

The Major Stage pilot board is neat and compact, occupying less than one fourth the space of **The Stage Pilot Board is compact** a knife switch-board with the same number of switches in a horizontal row. It can be set with its back to the wall as no space is required at the rear, except where dimmers are installed. Each switch, together with its connections and all other apparatus that goes to make up this pilot board, can be removed from the front.

The individual pilot unit switches for the borders, foot lights and proscenium strips are arranged in rows according to color controlled. These switches are in turn controlled by color-master pilot switches located to the left of the row, and the color-master are controlled by the master pilot situated to their left.

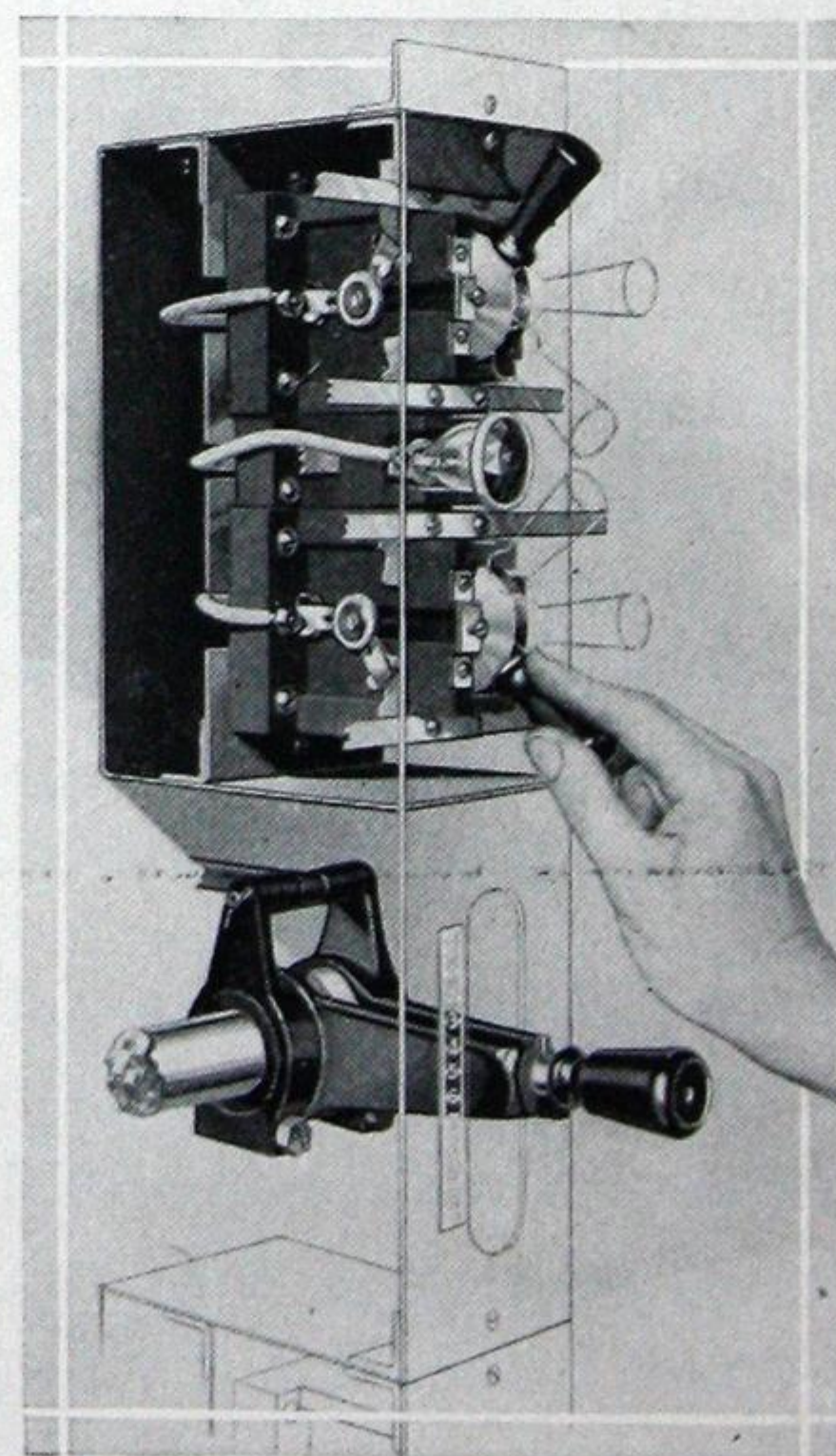
See diagram opposite page one. Any

switch, when set in the permanent **Pre-selective accumulation of control** position, will not operate until either the controlling color-master or general master is thrown into its momentary position, when it operates either to open or close the contactors on the remote control board. Any unit switch either closing or opening, may be operated separately, however, by throwing it into the momentary position. By this arrangement any possibility of leaving the current on the operating coils is avoided.

The permanent contact, therefore, is only used in "setting up" scenes, and by its use it is possible to set up several scenes in advance without affecting the scene in progress. In such cases the operator can set the necessary units in the permanent position and operate them simultaneously by the main control. The value of such an arrangement, where smooth performance is appreciated, and when an elaborate, spectacular scene is to be shown, is easily understood.

The Major Pilot Unit

The Major Pre-Selective single unit pilot switch is shown here. This unit consists of two small double-break



double-throw switches and a single light. The action is a fool-proof snap action of new design, remarkable in its positive action and sturdy construction.

The double clips for these switches are arranged so that when the handle is set in the up, or permanent, position, it will remain in place, but must be held in the down, or momentary, position. The action is made more positive by means of a spring which tends to hold the blades in the neutral position when not in the "set up" position. The operation is identical with an automatic elevator which stands at rest, goes up or goes down; it cannot be induced to travel in both directions at the same time, so with the Pilot Board of the Major System—the lights are either on or off, and it is impossible to form any set-up with these switches which will perform any other function. The switches on this pilot board are all the same capacity (60 ampere for mechanical strength only) and the greatest amount of current which any one pilot switch handles is usually seven-tenths of an ampere (less **Little current is handled by stage board** current than two 40 Watt Mazda lamps take) and never more than seven amperes.

This amount of current is all that the pilot board carries and therefore is the greatest amount broken on the stage, regardless of the stage load.

Pre-Selection with the "Major" pilot board is obtained by the switches being placed in their "set up" position or knife switch operation. The switch in this position sets up or extends the control to the "color master" or "grand

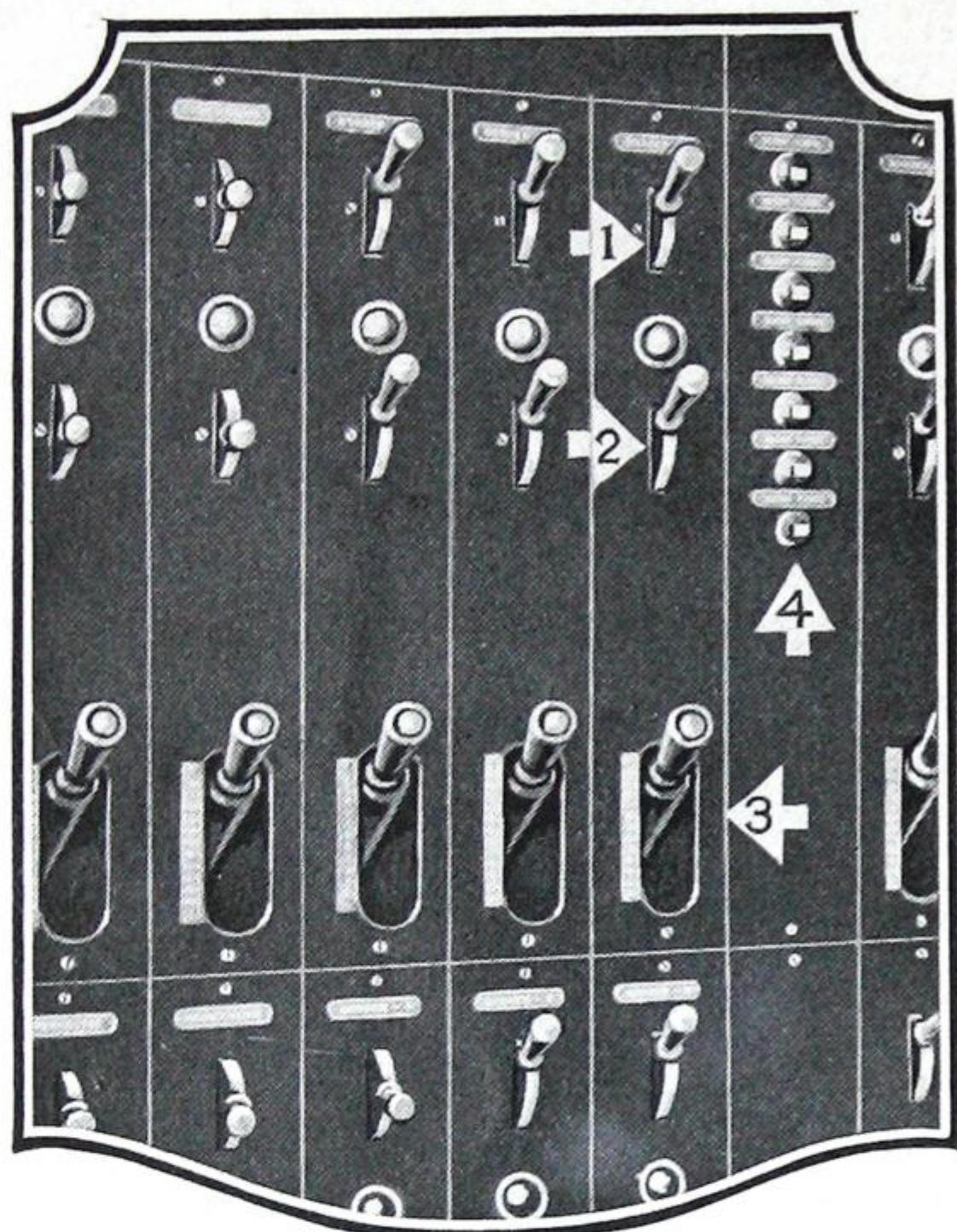
"Setting up" of scenes in advance master" pilot switch which is capable of controlling any or all of the mechanically held pilot switches. No current flows through this set up circuit until the master or color master pilot switch is operated to its momentary position.

The operation is just as simple for the momentary as for the "set-up," the switch handle being thrown down in one case and up in the other. By this arrangement it is a simple matter to get instantaneously any combination of lighting circuits on or off, singly or in whatever grouping is desired. Thus, while a scene is being played a "set-up" of the grouping wanted for the following scene (or several of them) can be made ready to light up on at the cue by pressure of one master handle. This without affecting the lights that are operating.

Location of dimmers in standard equipment Between the rows of Major Pilot switches are located the handles that control the dimmers of the same circuits. It should be remembered that the most highly successful theater switchboard is not the largest but the smallest which can be built to do the work. Unusual concentration is obtained by combining **Pilot board very compact** the pilot switches with the dimmer controls on the same board and each adjacent to the other.

To make this clear we will take one unit switch. (1) In the upper part of the unit is the "on" position lever. (2) Four inches below this is the "off" position

lever, which is also the pre-selective lever. Between these two is the pilot light that shows the condition of the



circuit controlled (whether the lamps are lighted or not. (3) Just below the lower handle is the handle of the dimmer plate which dims that particular circuit. There is a scale marked along the slot through which this dimmer handle protrudes, showing by position how much the lights are dimmed. This unit is repeated again and again for as many circuits as need be controlled. Further division of circuits where required, is made with **Subdivision of small circuits** tumbler switches, one panel along side of each set of pilot switches. By all of this you can see that the board is marvelously flexible as well as unusually compact. It seems impossible to believe the statement that the switchboard itself takes absolutely no additional stage space other than that required for the dimmer bank alone, but this is literally the truth. The Major Board is built to fit into the

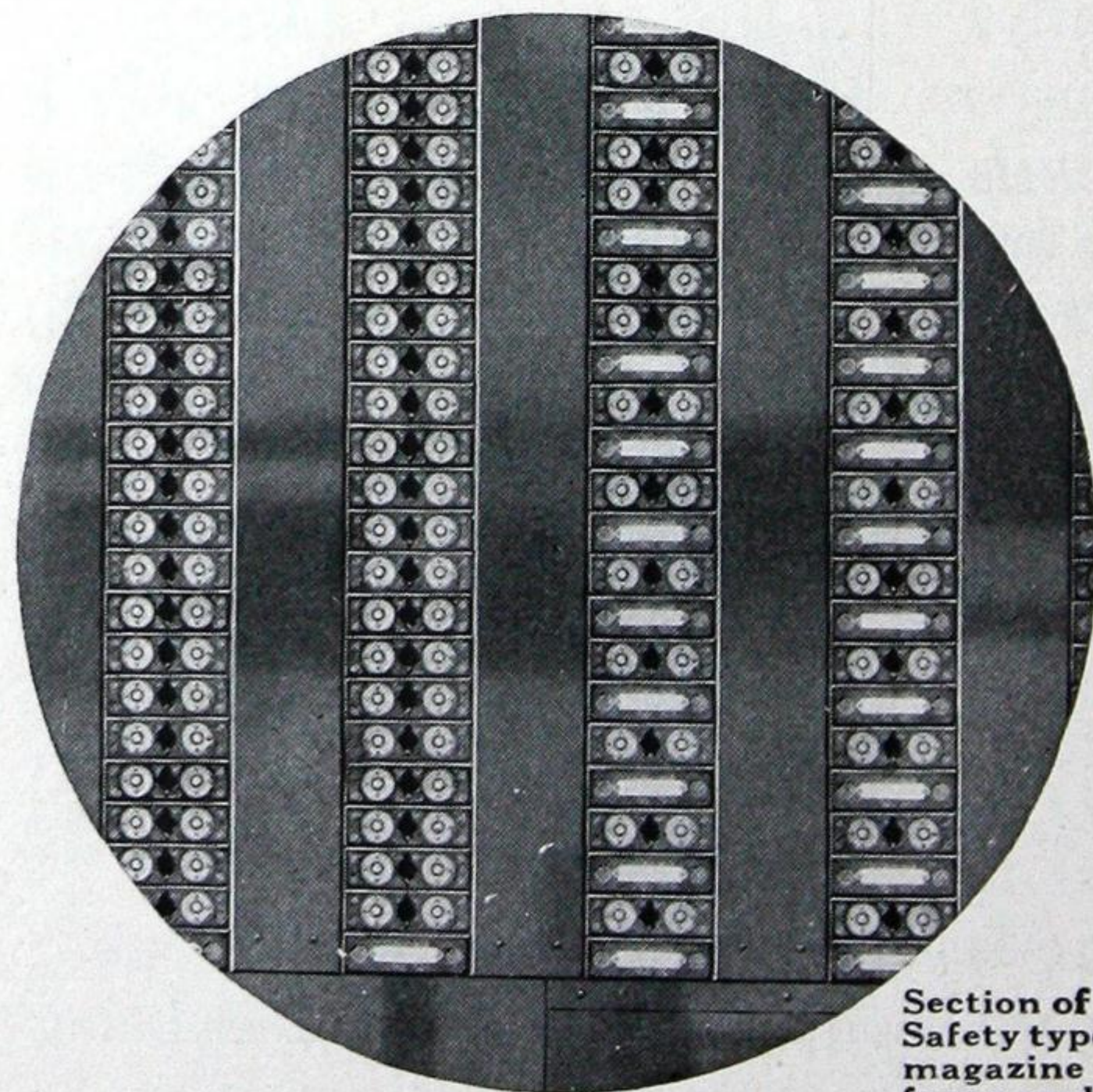
spaces left around the dimmer handles. This at once cuts the space required to that needed for dimmers.

The main control switches, the main dimmer levers and the slow motion wheel drive dimmer control are all located at one point of the board within reach of one man. From this point he makes all of his light changes. Between changes he "pre-selects" his successive scenes.

The Magazine Fuse Panel

Fuses for the circuits controlled are placed in the recess back of the Major Pilot Board located on the Stage.

The Major System magazine panel is sectionally constructed of the safety type units and is entirely dead face and absolutely safe. All metal parts are enclosed and a continuous barrier covers all wiring and terminals. These units are of moulded material that is practically unbreakable; it is impervi-



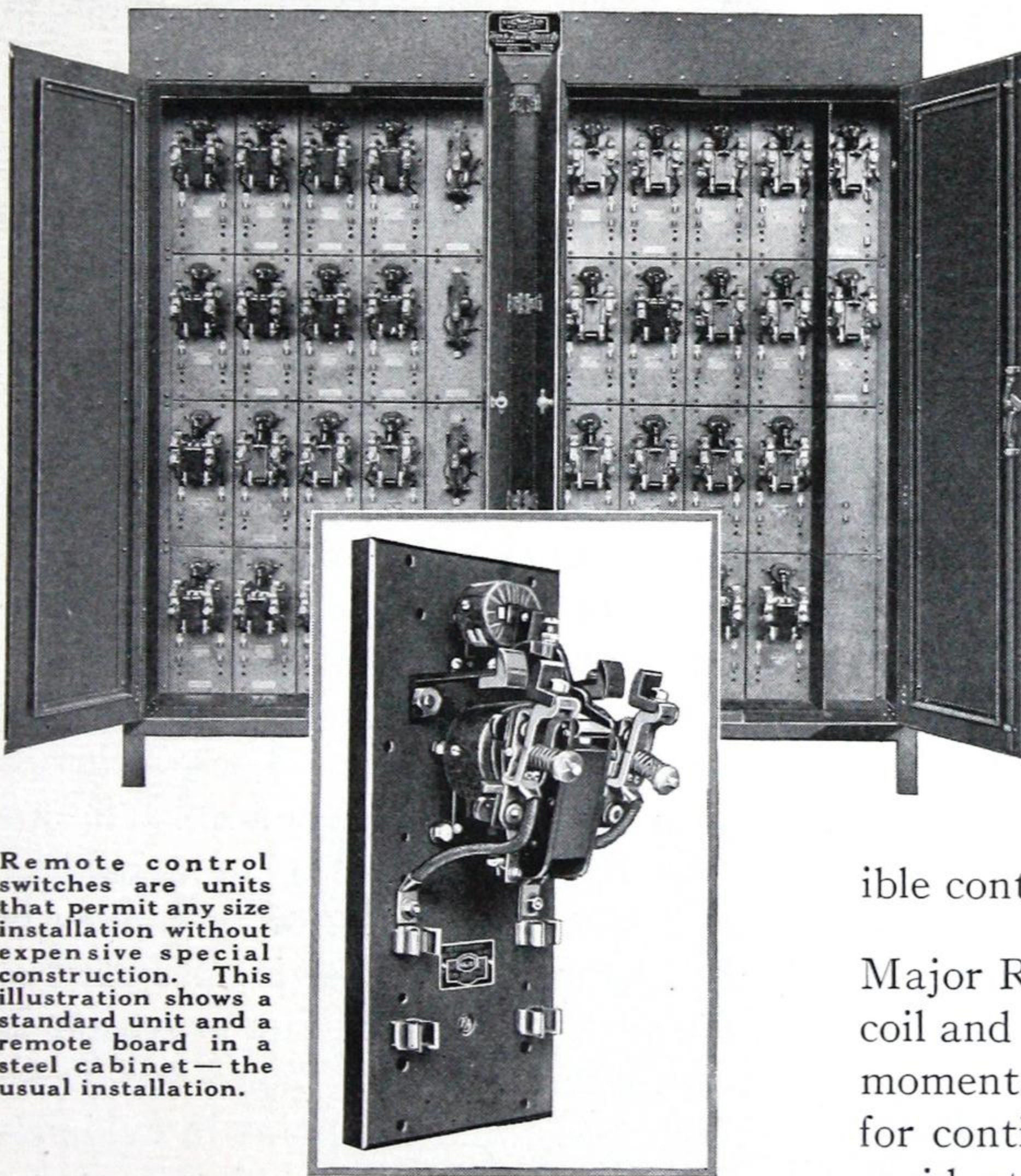
Section of
Safety type
magazine
fuse panel

ous to moisture and without mineral veins. Each circuit unit carries an index number that corresponds to that

on the Major System Schedule so that blown fuses can be quickly located and replaced.

The Remote Control Board

The Major System is based on remote control and uses the remote board



Remote control switches are units that permit any size installation without expensive special construction. This illustration shows a standard unit and a remote board in a steel cabinet—the usual installation.

illustrated above, varying the design to fit the installation.

The main electric supply cables for the theater lighting with the Major System go direct to the remote board room, located in the basement under the stage. This room (in the large installations) is of fireproof construction, of sufficient length and width to permit ample space all around the remote control switchboard that usually extends across one side, and the service board

at one end. In smaller installations, a steel cabinet is substituted for the room with equal protection. All remote board connections are of bus-bar construction—no wires being used. The remote control switches are of special design, made for the Major System by

the Cutler-Hammer Manufacturing Company. All magnet coils are impregnated to prevent any damage by moisture. This special switch is known as the latched-in type and has quick make and break, positive contact, and much longer life than usual remote control switches have. Remote control switches could never be used before the Major System was conceived because no previous method had ever been able to group them under flex-

ible control to meet theater conditions.

Major Remote Switches have an "On" coil and a "Release" coil which operate momentarily. Both coils are wound for continuous duty for safety against accidental or malicious holding the coil closed. In ordinary operation these coils only open and close the switch, a mechanical latch holds the switch closed. This is superior to the type that holds the switch closed by magnetic coil only, for should this give out the apparatus would be out of commission until the coil is replaced, while in a Major System type remote switch it is only necessary to push the switch closed and operate the circuit during the show with a dimmer. In hundreds

of Major installations, employing thousands of these switches, not one of these sturdy, over-size coils has ever delayed the show and burnouts are so few that it might be said to practically never happen.

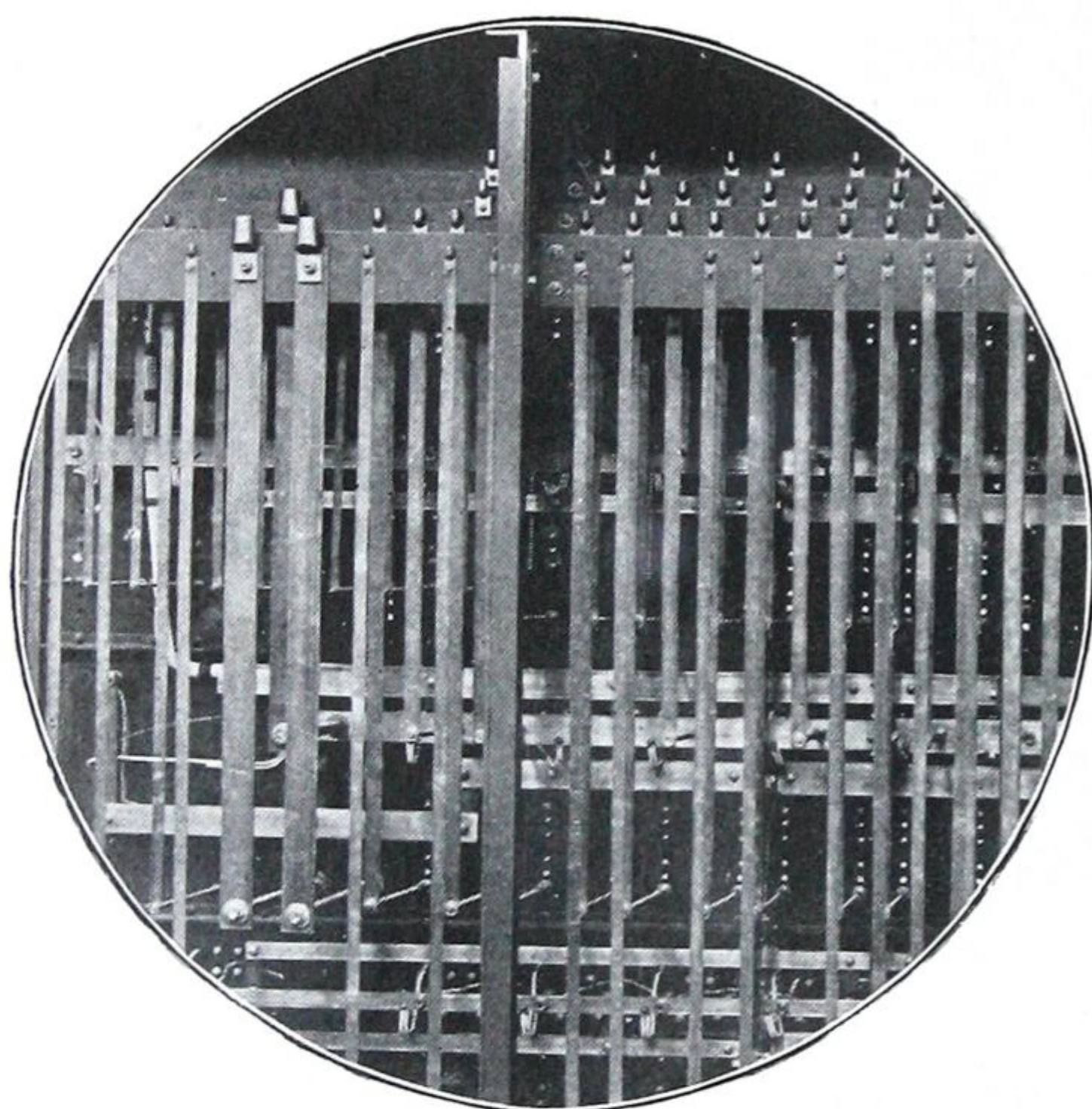
Only two No. 14 wires are required between the pilot switchboard and each

cabinet are all made with solid copper bus bars, eliminating all wire between switches. Illustration shows a section of this type of work. All sub-feeders are extended from remote switches to a terminal board at top. The Major System is the only one using this advanced type of construction.

The Great Value of Extended Remote Control

Another great advantage gained in this system is that the Major pilot board lends itself to extended remote control. The Motion Picture Operator can control either or both house and stage lights from the Motion Picture booth. Also, any number of these momentary contact push switches may be connected in multiple and placed in any part of the auditorium. These switches are usually placed in a concealed or out of the way location or in a cabinet fitted with glass front to be broken in case of emergency. This is not included in regular equipment but provision is made on each Pilot Board for these connections, another point in evidence of the great flexibility of the Major Pre-Selective System.

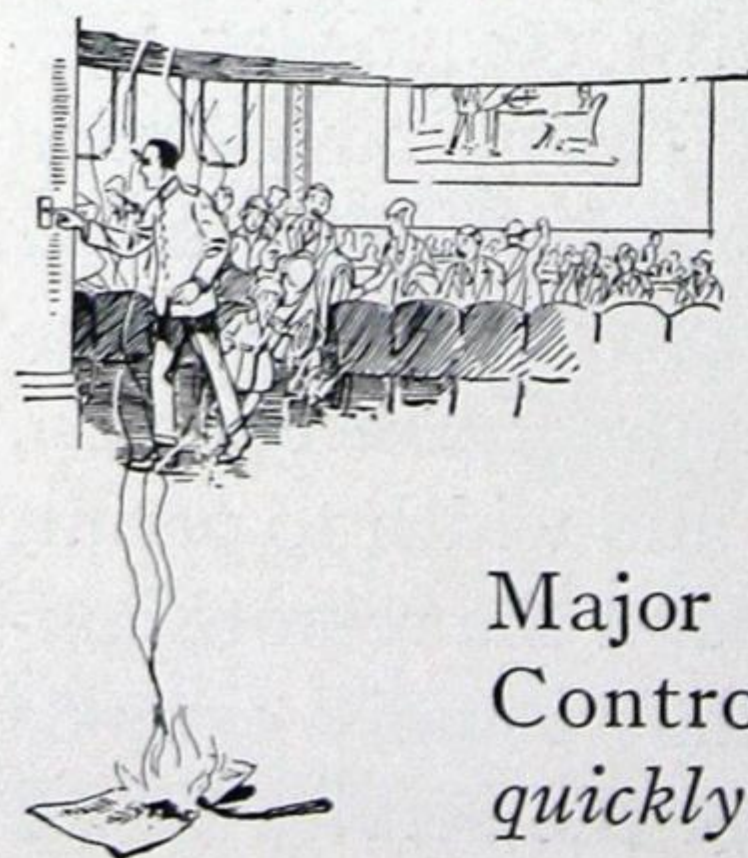
Most panics occur from fear caused by trivial incidents *and darkness*—an audience is usually orderly when the lights are on. The Major Extended Remote Control turns them on *quickly*.



Bus Bar Work Back of Remote Switch Board

remote switch—the branch circuits and feeders go through to their respective locations. The Major System is installed exactly as any other switchboard, the remote board being wired as though the switches were to be worked by hand. The Major Pilot Board simply controls the switches from the stage and the cost of the few runs of No. 14 wire is more than compensated by the saving in heavy cable, conduit and labor the old switchboards or the dead front switchboards require.

The connections on the remote control board whether placed in a fireproof room in the basement or enclosed in a steel



The New Bench-Type Major Pilot Switchboard with Remote Control Dimmers

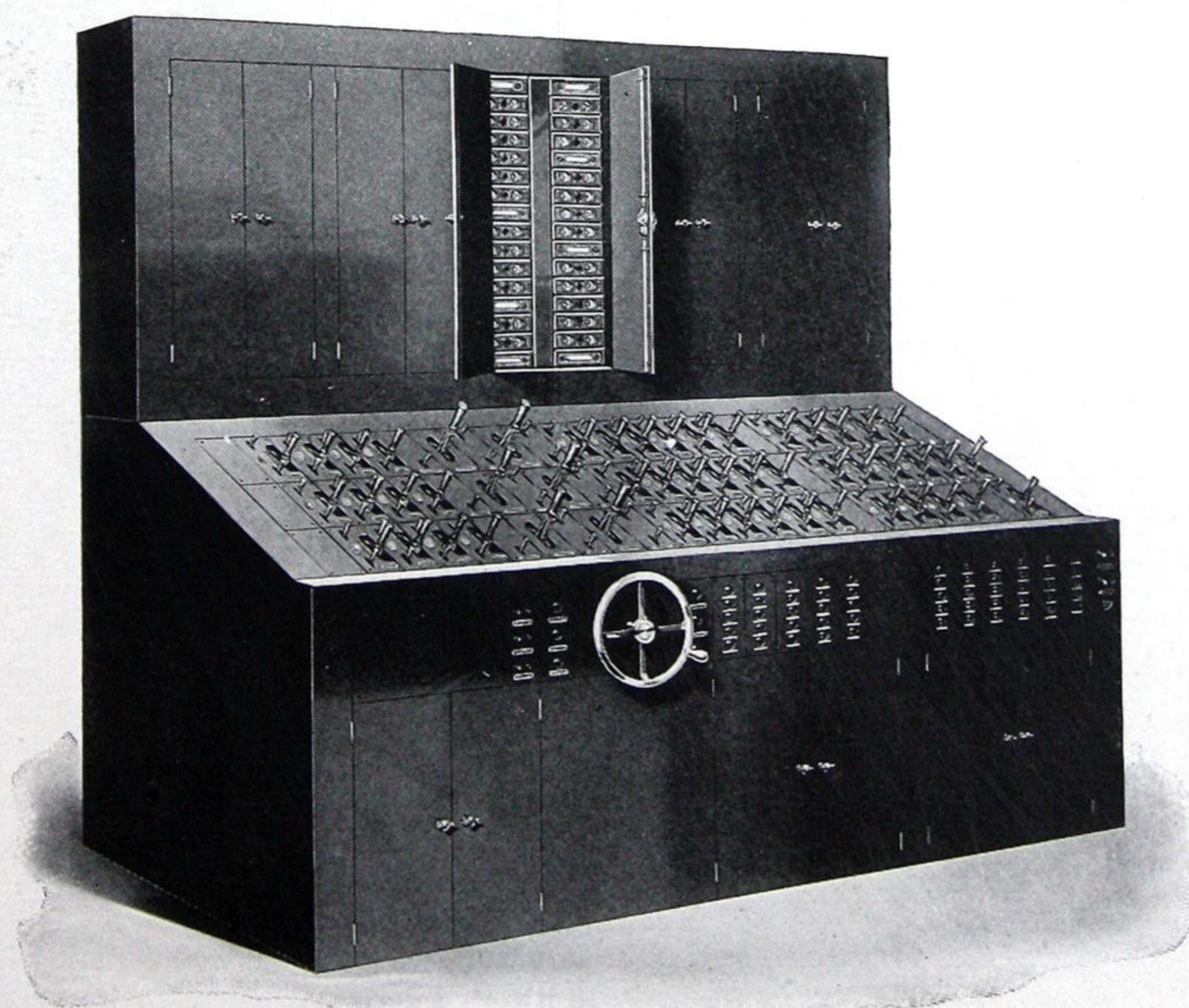
This is a new and remarkable combination pilot board, for it contains in very small space all the workable units needed for stage and auditorium lighting and dimming control. The pilot board illustrated occupies only a floor space 3x8, and the safety type magazine fuse panel built above makes it possible to set it against the wall, without recessing if desired.

The pilot dimmers, one of the very latest developments in remote control, are located under the sloping top of the bench in a manner that permits easy access for wiring and maintenance. The control handles for the remote control dimmer plates extend through the top, adjacent to the switch

handle of the lights it dims. The remote control dimmers being so much lighter and smaller than the direct type, are handled with greater ease, and the master slow motion wheel drive, conveniently located in the front, can easily be handled with one hand.

This Special Bench Type has all of the advantages of the Standard Major Pilot Board, in addition to those mentioned above, and for stages where space is to be conserved to the greatest extent it is the highest concentration of control yet achieved.

The action of the new remote dimmers is in principle much the same as the operation of the remote switch. The pilot dimmer is mounted on the stage board and the main bank of dimmers are placed in the basement with the remote control switchboard.



Major Bench-Type Switch Board

Major System Types

As the Major System is of unit construction and capable of almost infinite divisioning of circuits to be controlled, any number of types might be made up. However, practically every size and kind of installation can be fully served by the following types.

Standard

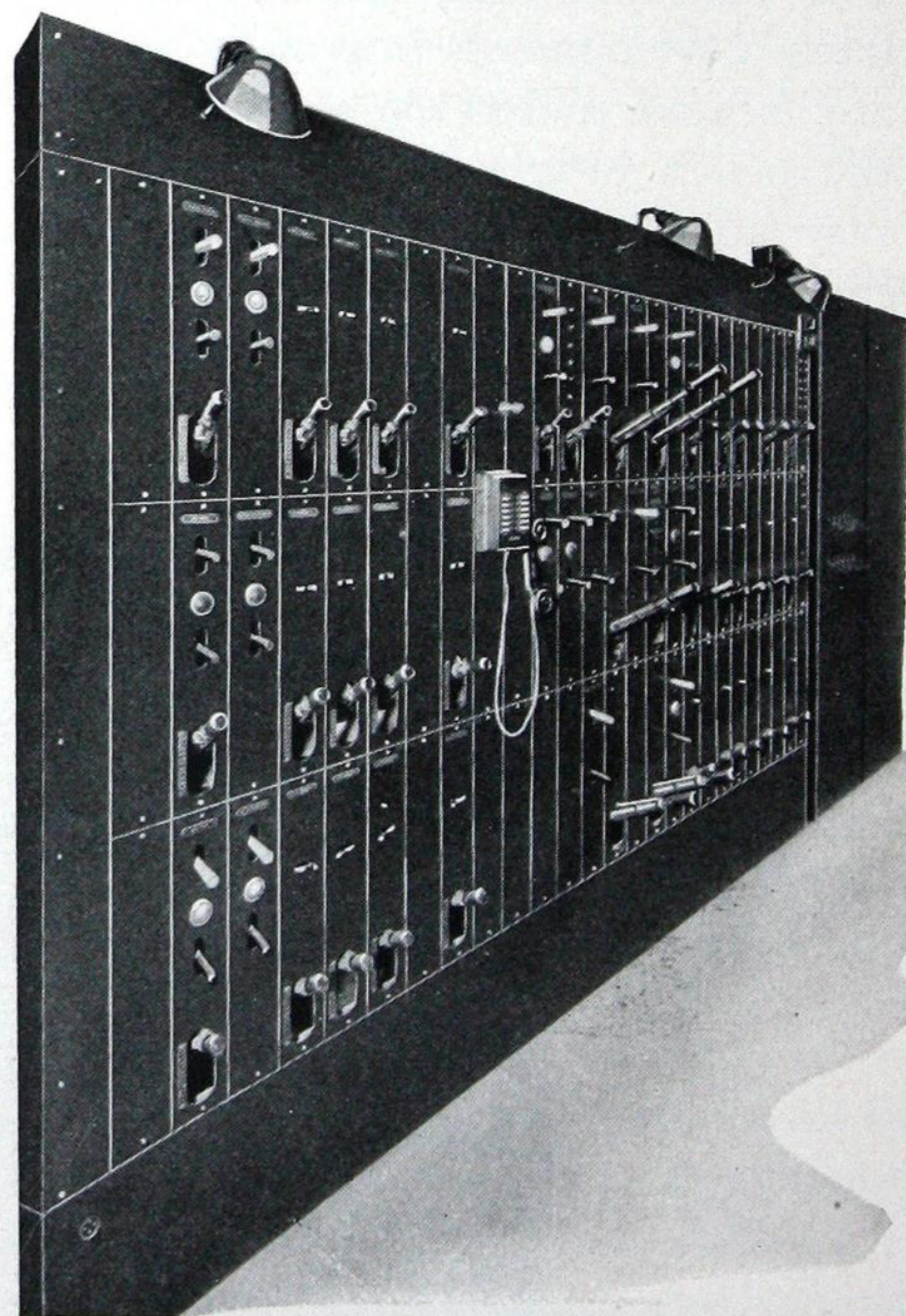
The Major System in the standard type is a complete control switchboard of each subdivision of the feeder system by pilot and magnetic switches.

The majority of Theaters, High Schools, Public Auditoriums, Masonic Auditoriums, Music Halls; in fact any building that has a stage or auditorium can use to advantage the Standard Major System. An example of the Standard Type is illustrated on the opposite page.

Modified Types

There are also modified types of the Major System, which, instead of controlling the feeder system with pilot and remote magnetic switches only, controls a number of the feeders with locally operated switches, which greatly reduces the cost of this type of Major System. Three modifications of the Major System called the modified Type "A", Type "B", and Type "C" are made so that any condition of

operating service can be fulfilled. On the last modification known as Type "C" the cost of this Major System is less than the interlocking, dead front, stage switchboard, and still retains in addition to all the features of a dead face board a great many of the values of the Standard Major System. The modified type illustrated below shows how the method of grouping the remote control and locally operated switches is carried out.



Modified Type Major Pilot Switch Board

Features of Operation

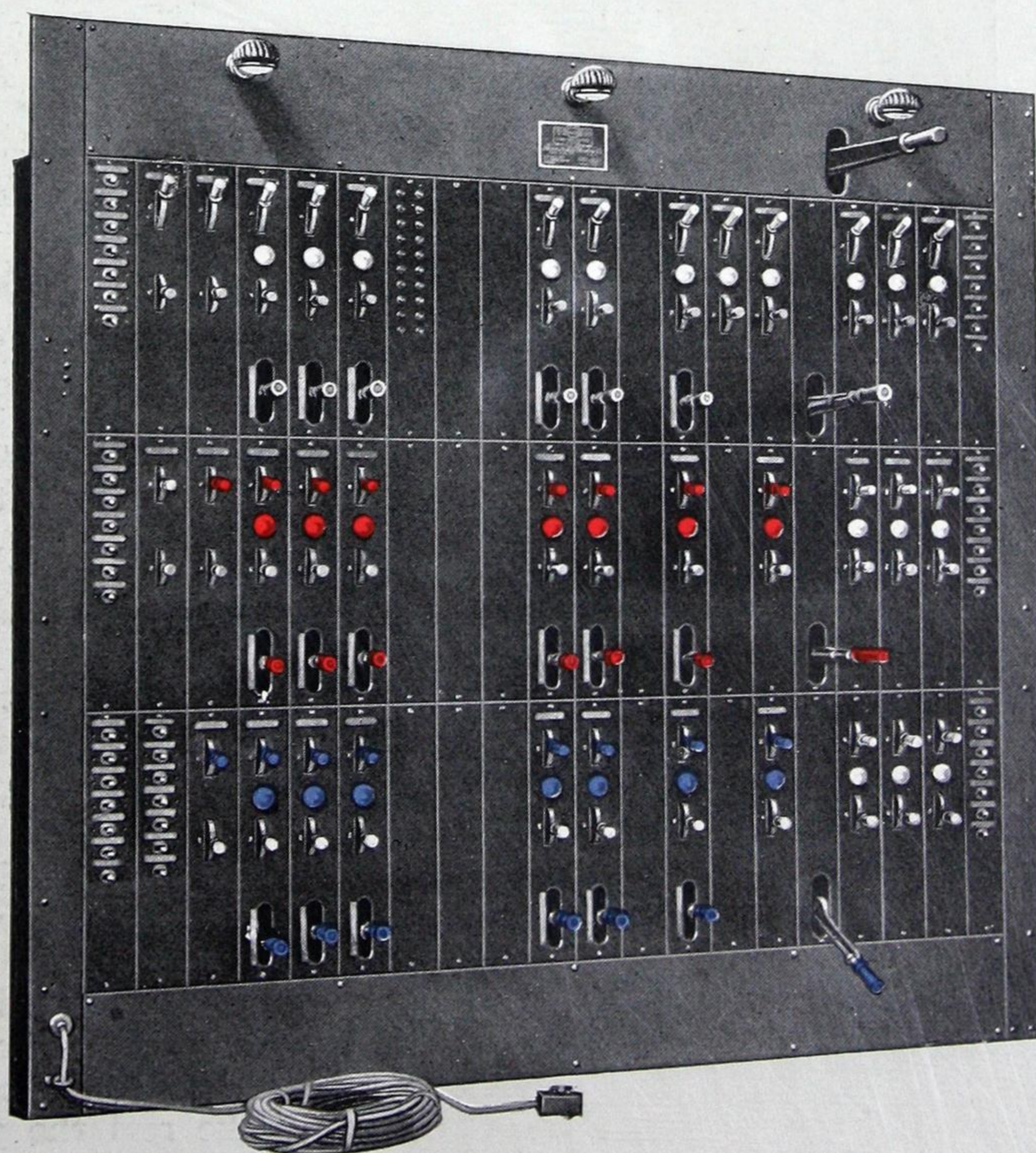
Simplicity of operation, flexibility of control safety of handling, speed in changing scenes, reliability of action and quick certain selection of correct switches, all these are characteristics of the Major System.

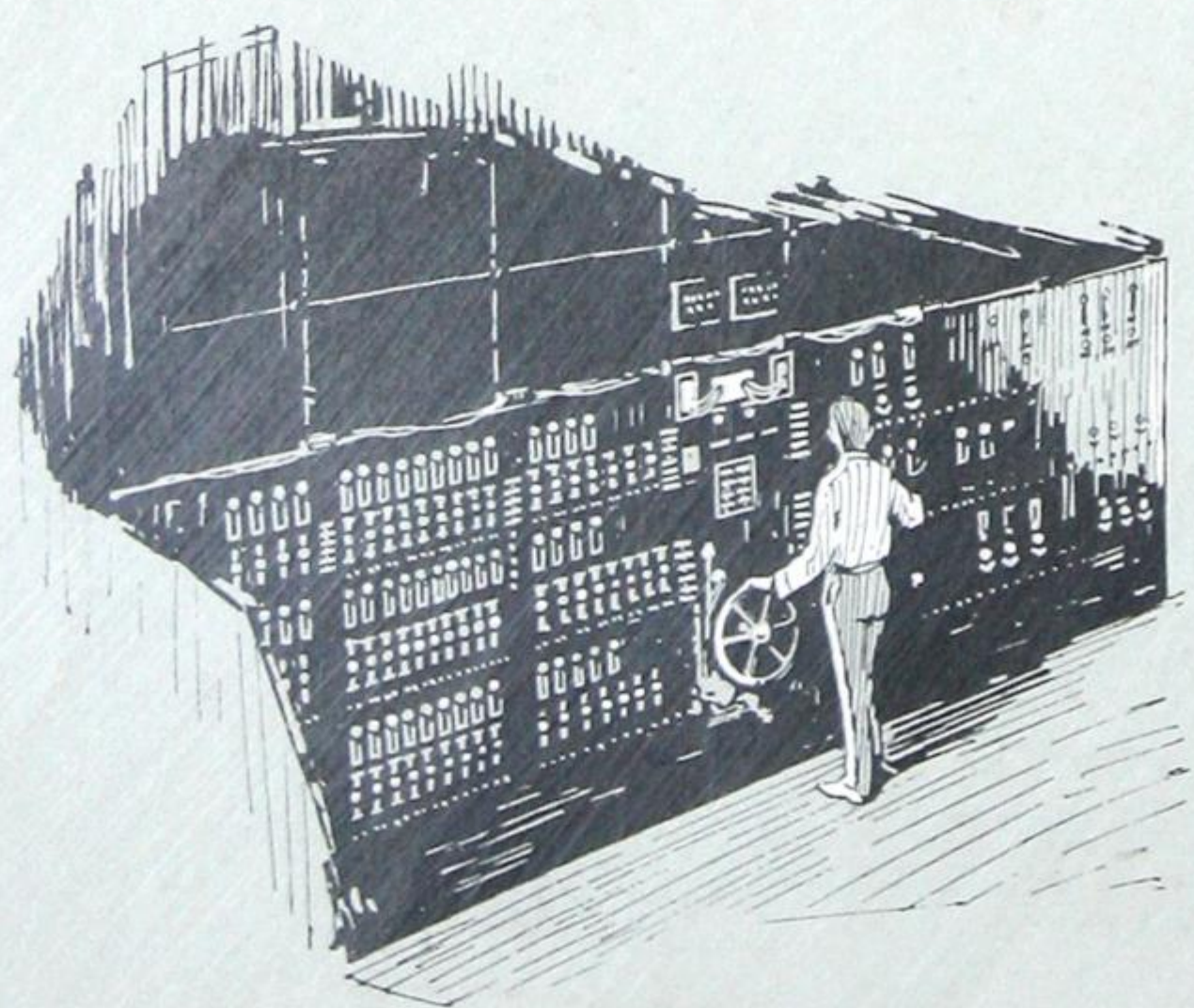
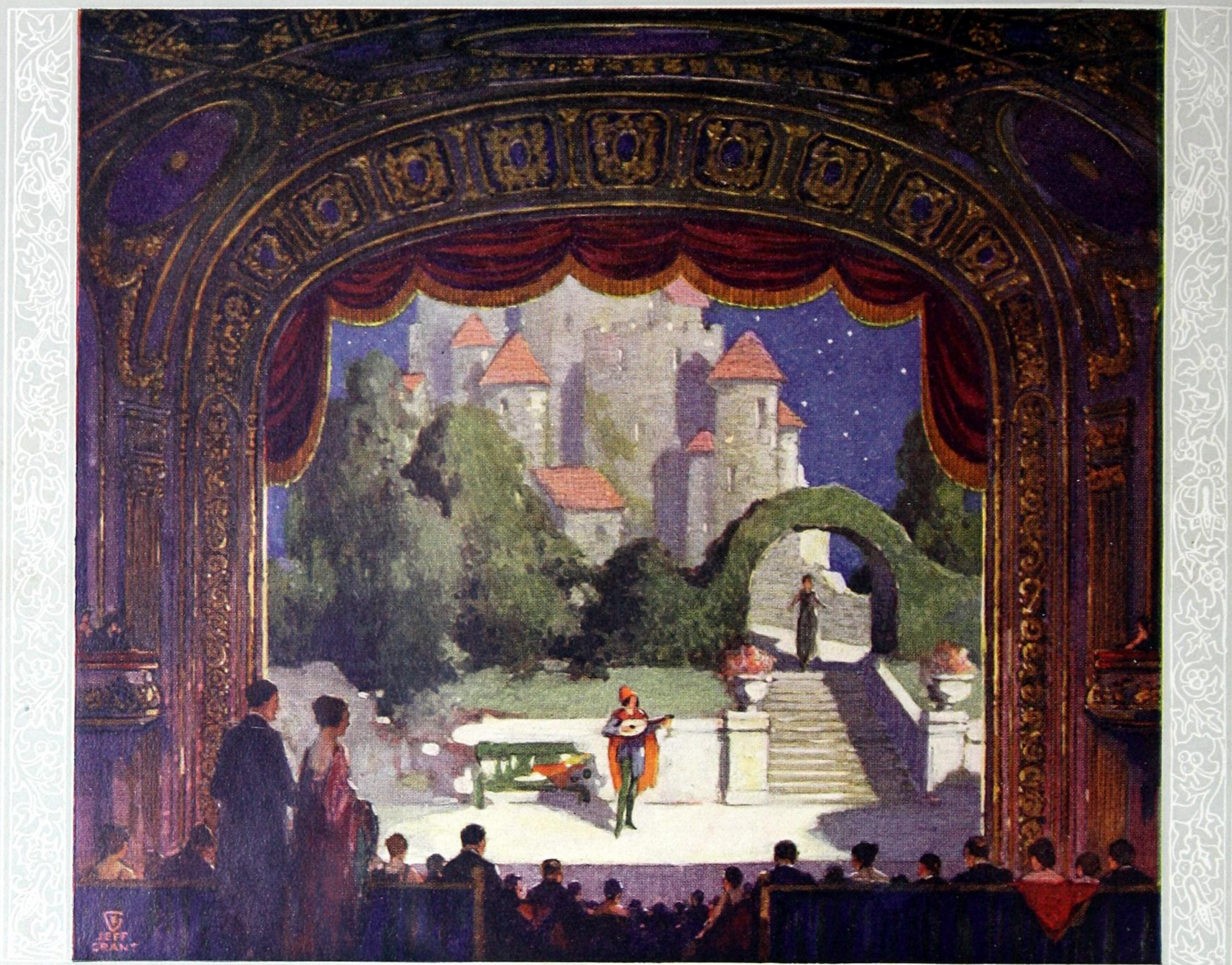
The handles and pilot lights of the red circuits are red, the blue ones blue, amber ones, amber and the white ones, white—no memory system needed—no chance of error. Each group is natural arrangement, the switch and dimmer handle of the same circuit together, the main controls grouped together.

For extended stage control for turning off and on preselected lights while on the scene a small cable of any desired length equipped with universal plug is used. Every Major System has this.

A special unit of equipment easily added to a Major System is the "All-out" switch, of utmost convenience in vaudeville theaters. This is a multiple contact remote switch controlled by a simple momentary contact switch on the pilot board that turns out every light on the stage regardless of the position of individual switches. The same lights can be again turned on by the stage master, or any new combination desired can be set up. For dark changes, putting the piano on in "one" and in a number of other ways it is very useful. Only Major Systems can be equipped for this method of operation.

Electrical locking of the stage switch-board, with any combination of lighting on, is accomplished by a momentary contact switch inconspicuously located on the pilot board. The electrician can then be away from the board without the danger of anyone else accidentally or intentionally meddling with the switches. Every Major System can be easily equipped with this lock.





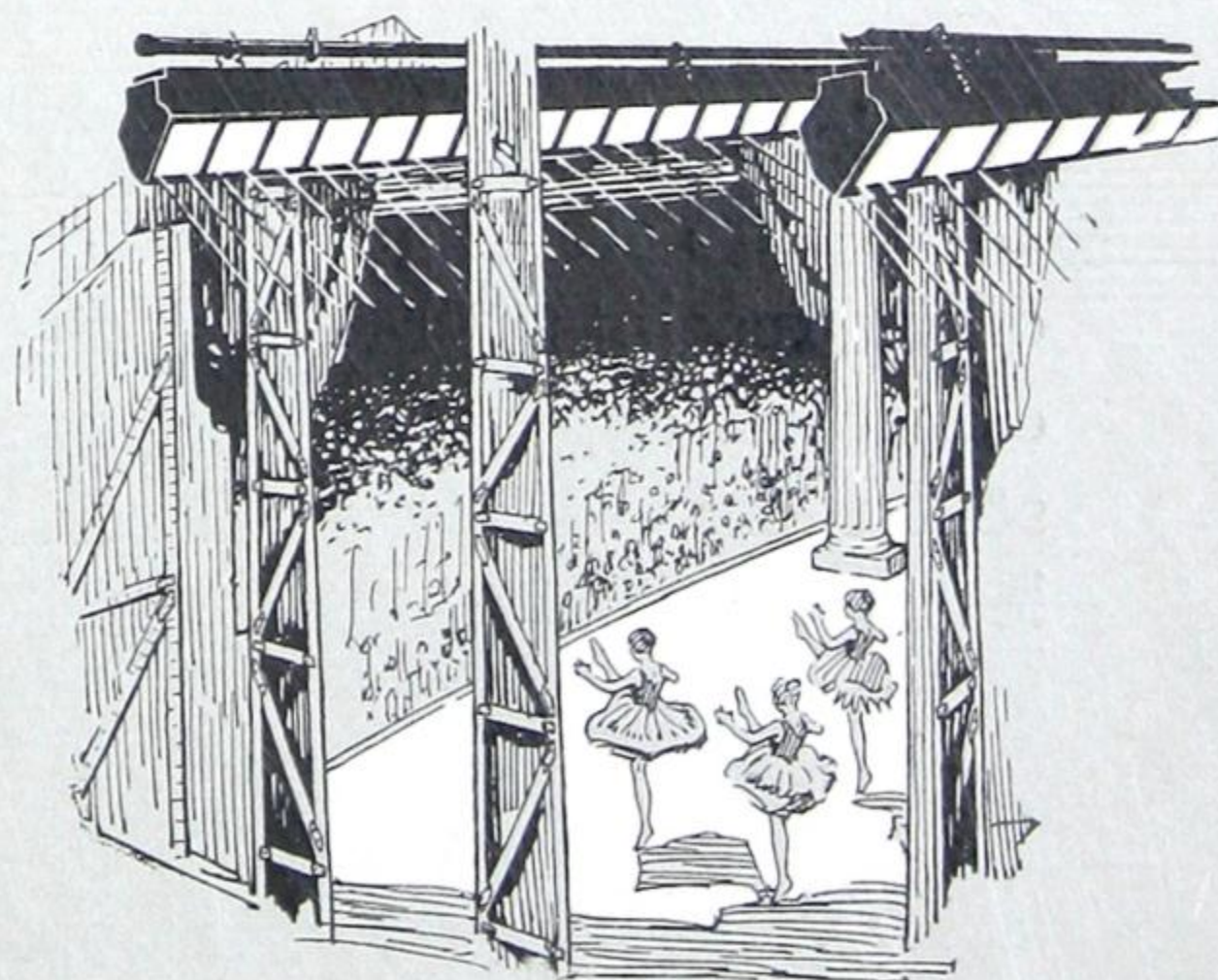
Starry nights are nights of light—the blue of night requires as much volume of light as a day scene—for only a small percentage of the light gets through the blue coloring screens.

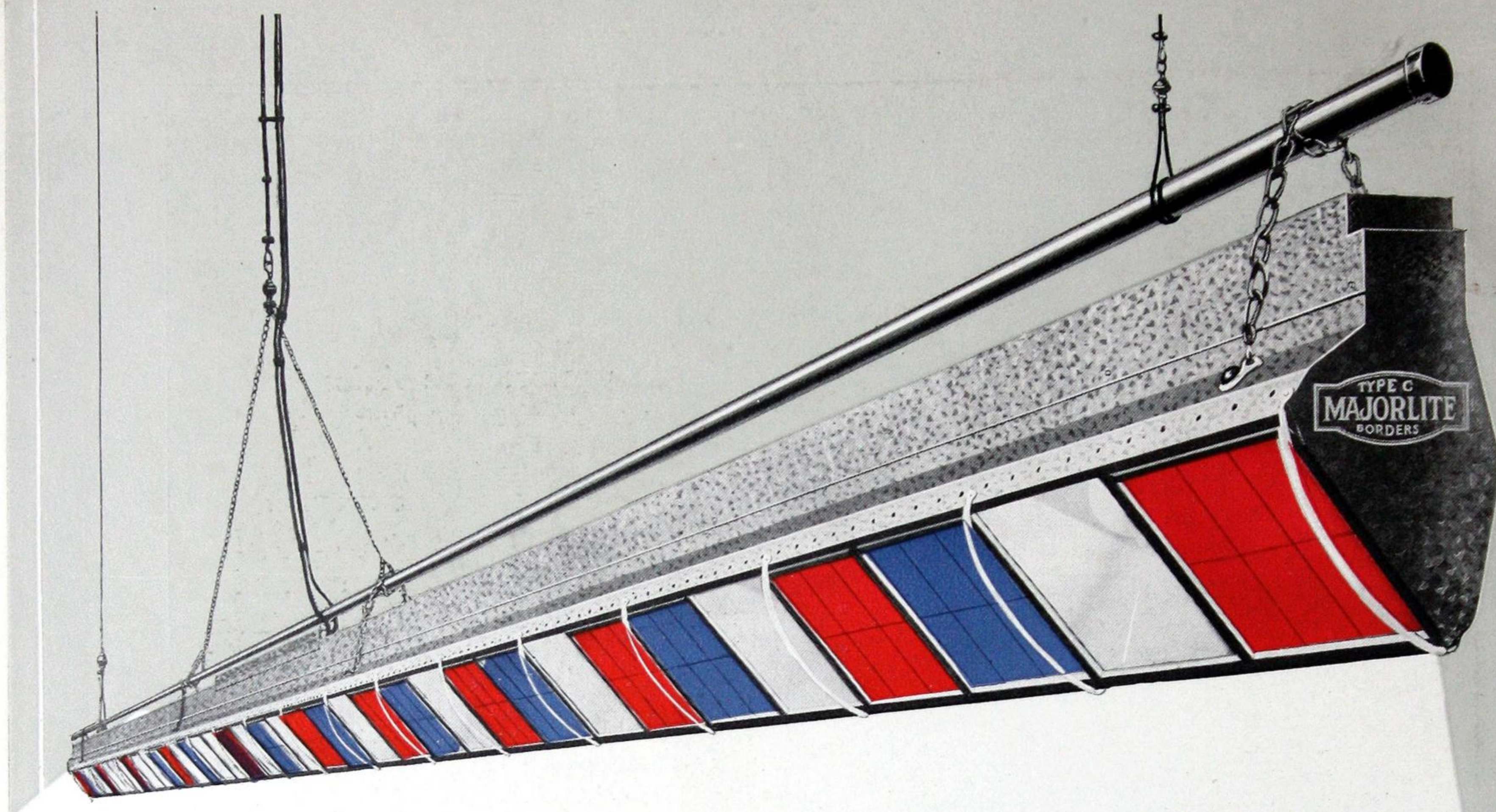
Painted scenery can approximate the real to a certain extent, but it is almost a total failure without proper lighting. Artists can paint the effect of light but have never been able to put luminosity into pigments. Light is light and can not be imitated—it can only be produced and controlled to lend its beauty to scenic splendor and make real the painted castles of the theater.



Blazing sun of the desert countries—cool lights of the far north—what an infinite variety of faithful representations of nature flexible light control makes possible!

Light, as an important feature of the theater is being recognized to a greater extent every day. Plays have been produced in which the scenery has literally been “painted” with light—the basic tone being gray. Famous scenic artists now paint under the color of light each scene will have in the performance, obtaining a richness of effect possible no other way. The Major System can interpret in light every wish of artist and producer.





Majorlights Flood the Stage with Light

Majorlite Border Lights, the most practical of all Type C Nitrogen Lamp equipment for stage use, have desirable features for everyone whose profits or satisfactory performance depends on light.

The House Manager desires them for the full volume light they give at less cost. They produce the beautiful effects obtained in the leading metropolitan theaters. They reduce cost of lamps by 20%, by eliminating loss and breakage due to "dipping" of colors—and permit a wider range of color effects. Regardless of the type of attractions booked, Majorlite Border Lights are assets gauged by added box office receipts. Many theaters have discarded expensive equipment to install them. Ask your electrician, then let us give prices and the equipment for your stage.

The Theatrical Producer emphatically votes for Majorlite Border Lights at first sight. Color slides can be

changed whenever desired, any color obtained and a strong enough light to use full color without having a "dark" stage. His efforts obtain better results, his scenes are exquisite in color and the whole has an appearance of quality that helps make the show a success. In theaters where the show afterward appears all of the original beauty is retained if the theater has Majorlite Border Lights to produce the light.

The Stage Electrician is the one who has had the long, tedious, dirty, monotonous, almost hideous job of lamp washing and dipping. He knows the wasteful loss of money for broken lamps and lamps loose at the base. Washing and dipping costs a vast amount of money yearly in theaters throughout the country. How much

Description

Illustration above is the end view—along border showing color slides in place. Each lamp is in a separate compartment with vents at front, rear and top. Made for 300 or 500 watt type C lamps on 12-in. centers. Equipped with Mogul receptacles. Wired for any number of controls or circuits. All lamps are clear but any desired color may be produced by inserting color slides or color frames in grooves. Painted two coats flat black outside and two coats aluminum inside, furnished in any desired length. The center lamp in each border is on a separate circuit and is used as a work light.

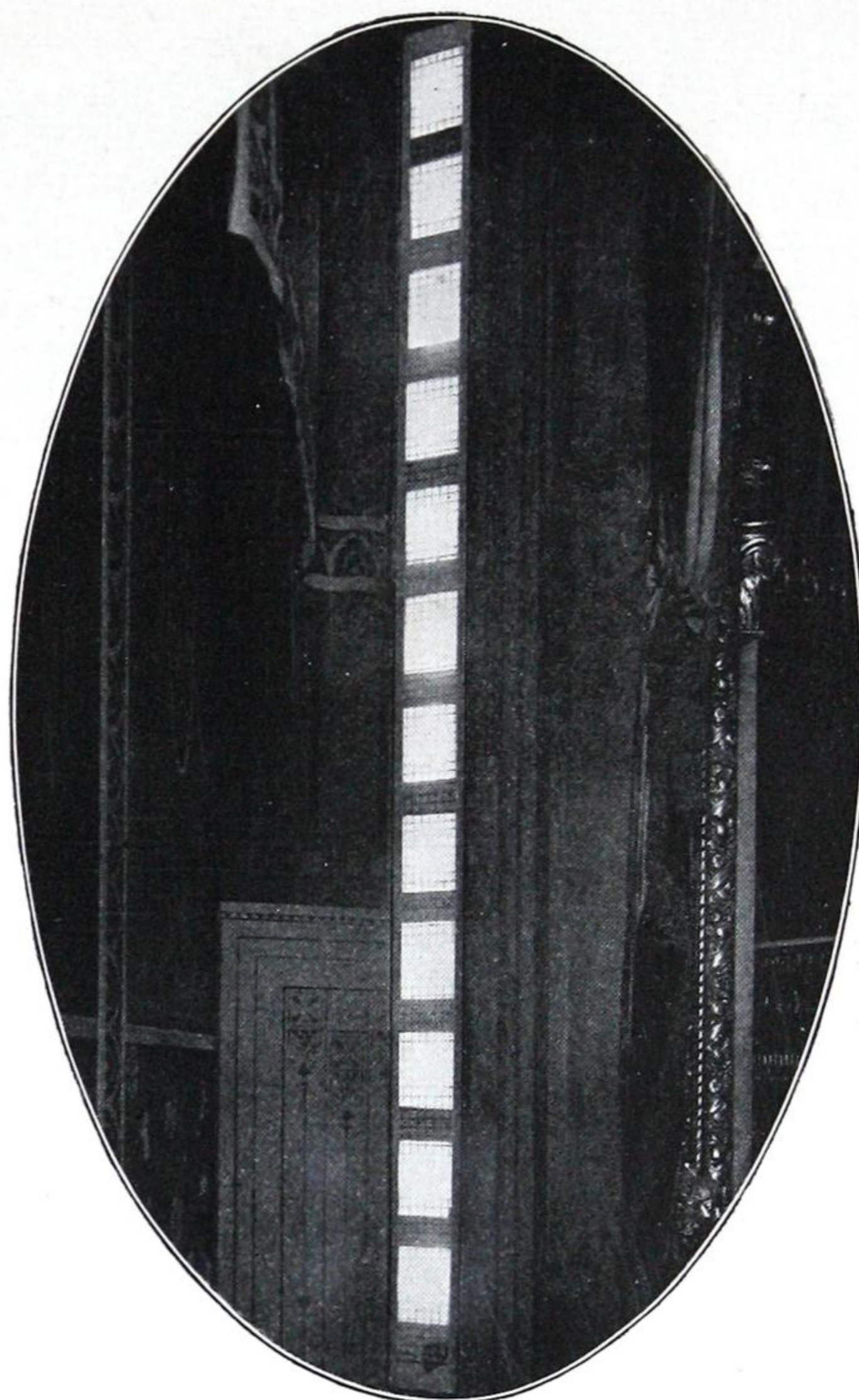
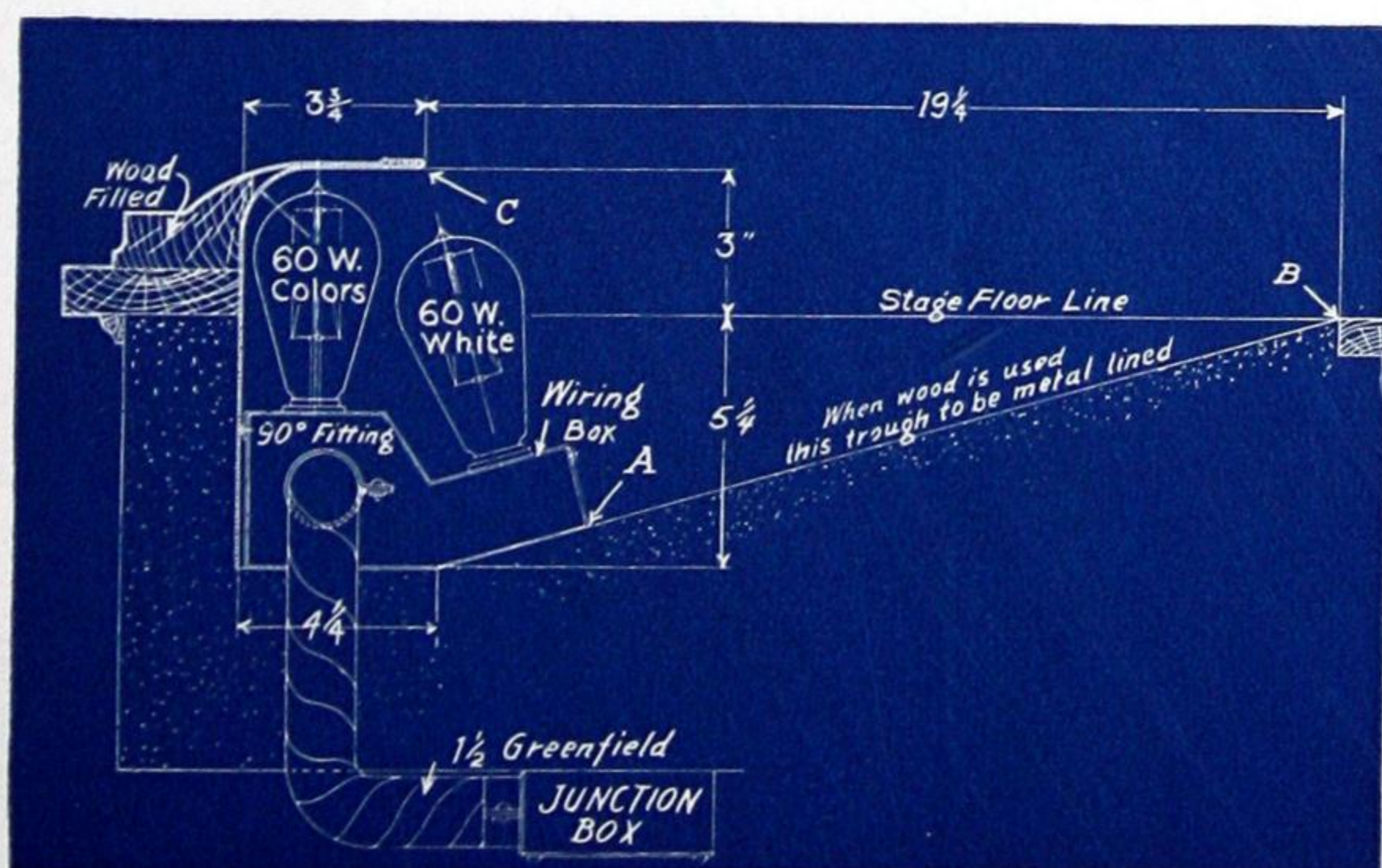
better are Majorlites! Few lamps instead of hundreds—color slides well protected by iron deflecting rods in place of dipping—built of smooth metal, no corners or projections, and only 9 inches wide over all. The carpenter smiles, for the most fragile gauze drop passes without fouling.

Footlights

and the Construction of the Trough

Proper design and construction of the footlight trough has a great deal to do with the effectiveness of footlights. The small blue print below gives dimensions for a successful installation and shows the Major two-strip footlight wiring box. All interior surfaces of concrete work should be smoothly finished to exact dimensions. The light strip wiring box is made three feet shorter than the proscenium arch opening with sufficient $1\frac{1}{2}$ " flexible conduit to Junction Box to permit removal of lighting strips to the stage.

The painting should be two coats aluminum bronze on the surface from "A" to "C" and a good flat dull color from "A" to "B."



Proscenium Strip Lights

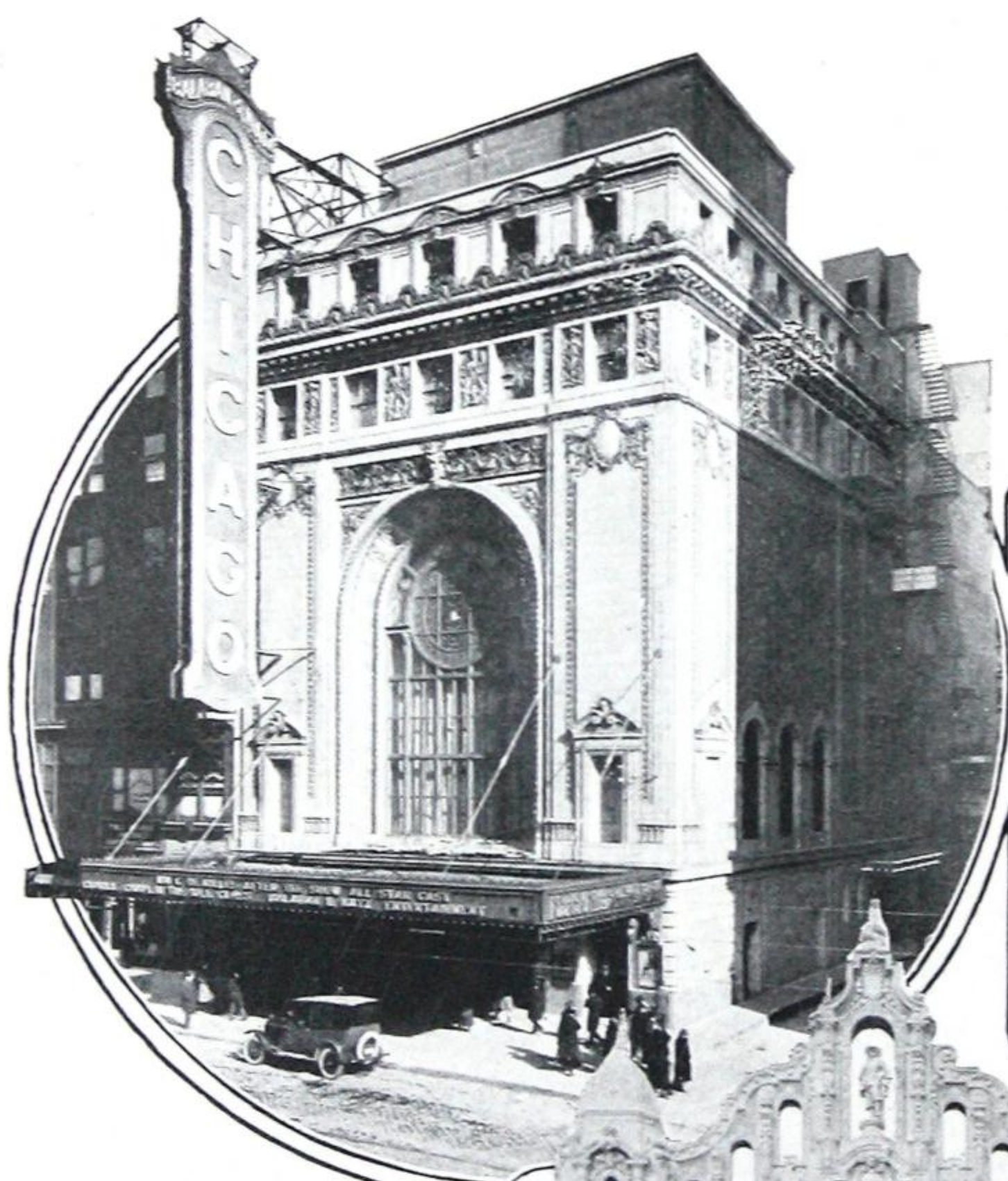
Many stages, improperly equipped, have dark spots to the right and left near the first entrance. This is due to poor proscenium strips. Major Proscenium Strips are designed to eliminate shadows at these points. They are constructed very similar to the Majorlite Borderlights, and have their general advantages. The lamps are all white, and color slides are provided for use when color is desired. New theater proscenium installation should be recessed, the better way, while an old theater can hinge and swing them out of the way when not in use.

Finest Theaters Everywhere Use Major Systems

It is natural, in the development of the higher types of entertainment, with the control of light an important factor, that a constantly increasing demand for Major Systems should follow. This is because only the Major System provides means of getting the most out of every type of entertainment.

The Major System is the finest built, yet it does the work for the least expenditure of money, all things considered and at the greatest saving in space, time and maintenance. There is no theater so small or none so large that the Major System will not exactly fill the necessary and profitable requirements.

The Major Pre-Selective System can be installed in both old and new theaters. Most of the replacements in the country's larger theaters are Major System installations.



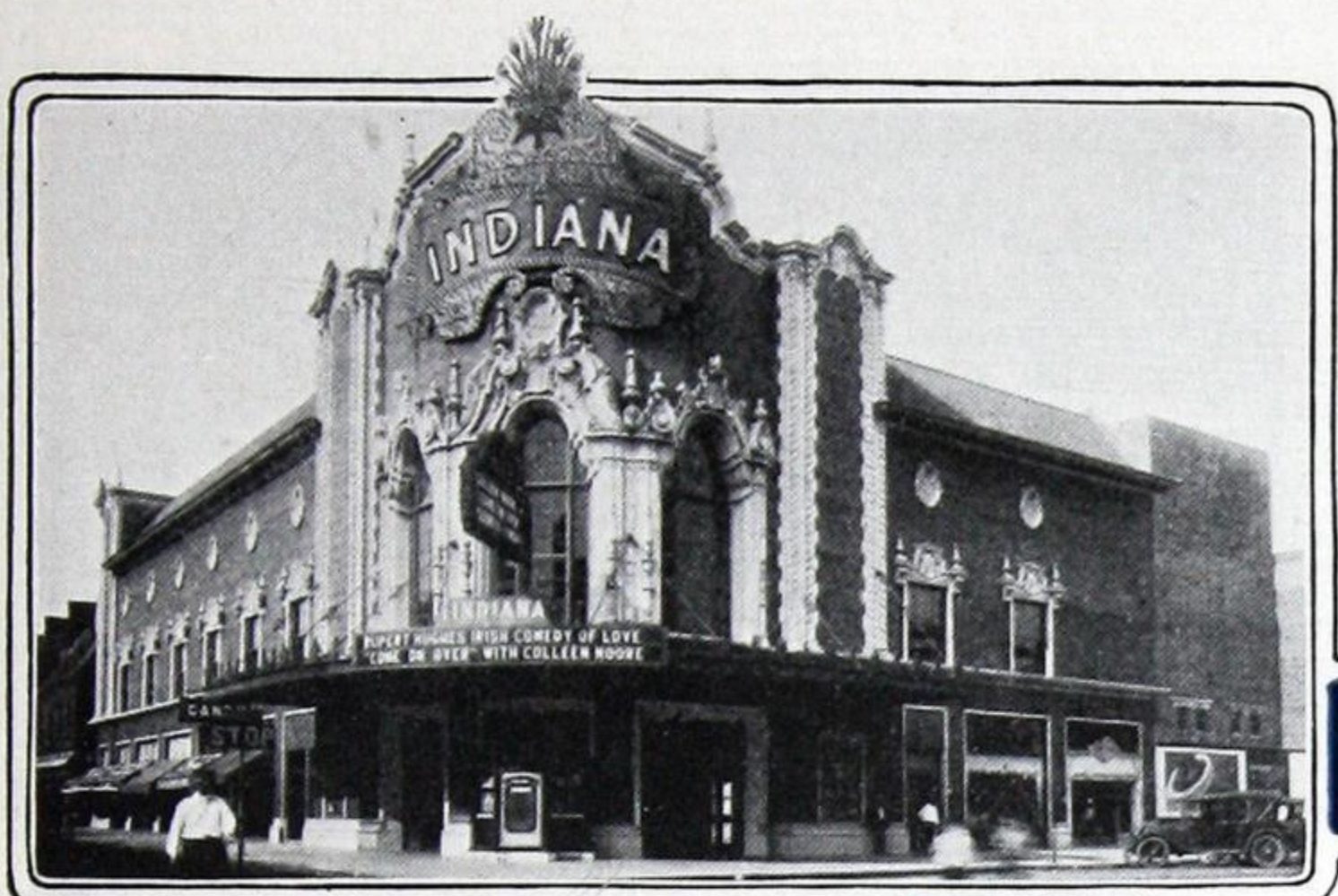
Chicago Theater, Chicago, Illinois
C. W. & Geo. L. Rapp, Architects



McVicker's Theatre, Chicago
Thomas W. Lamb, Architect
Henry L. Newhouse, Resident Architect



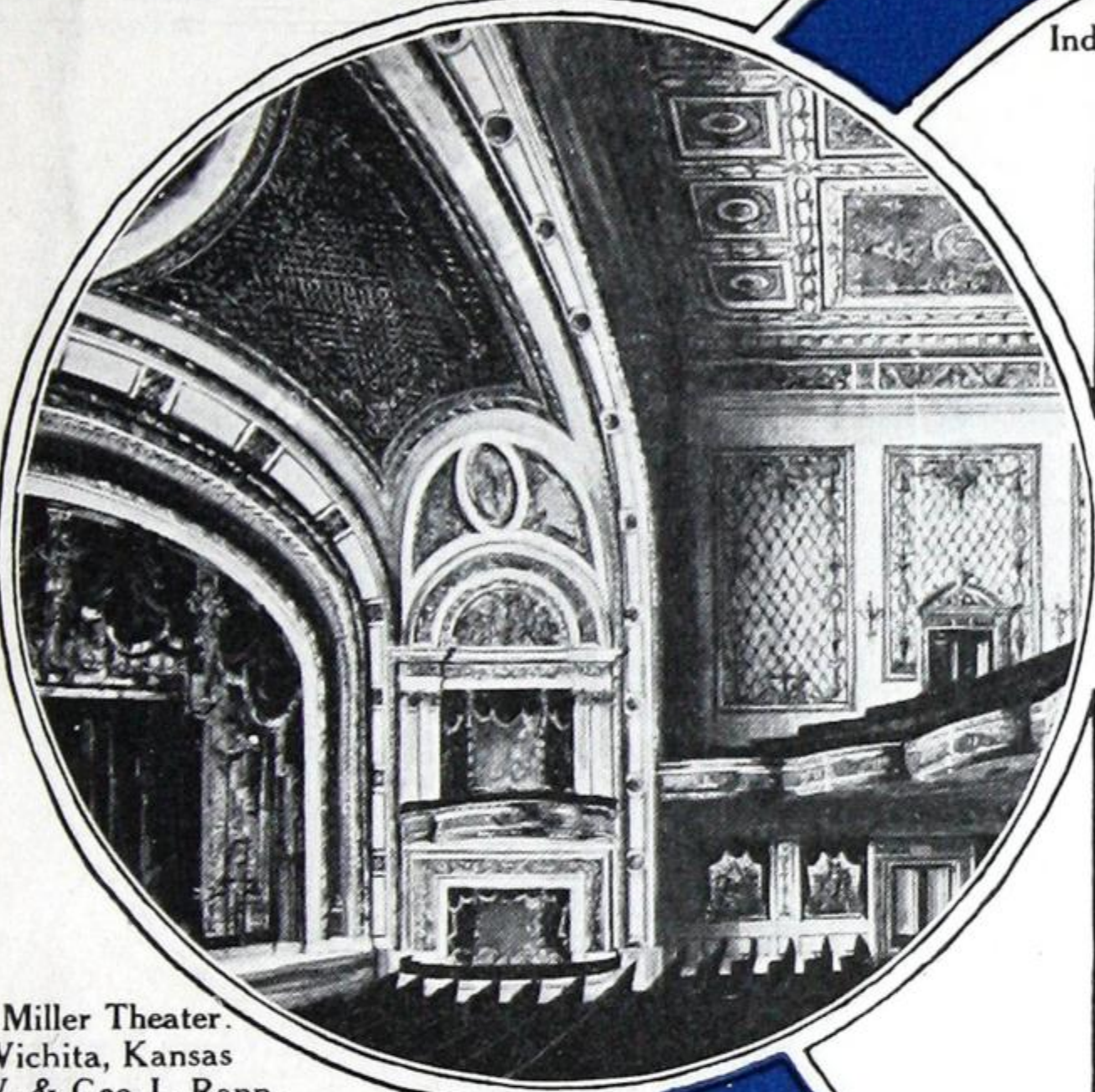
Granada Theater, San Francisco, California
Alfred H. Jacobs, Architect



Indiana Theater Terre Haute,
John Eberson, Architect



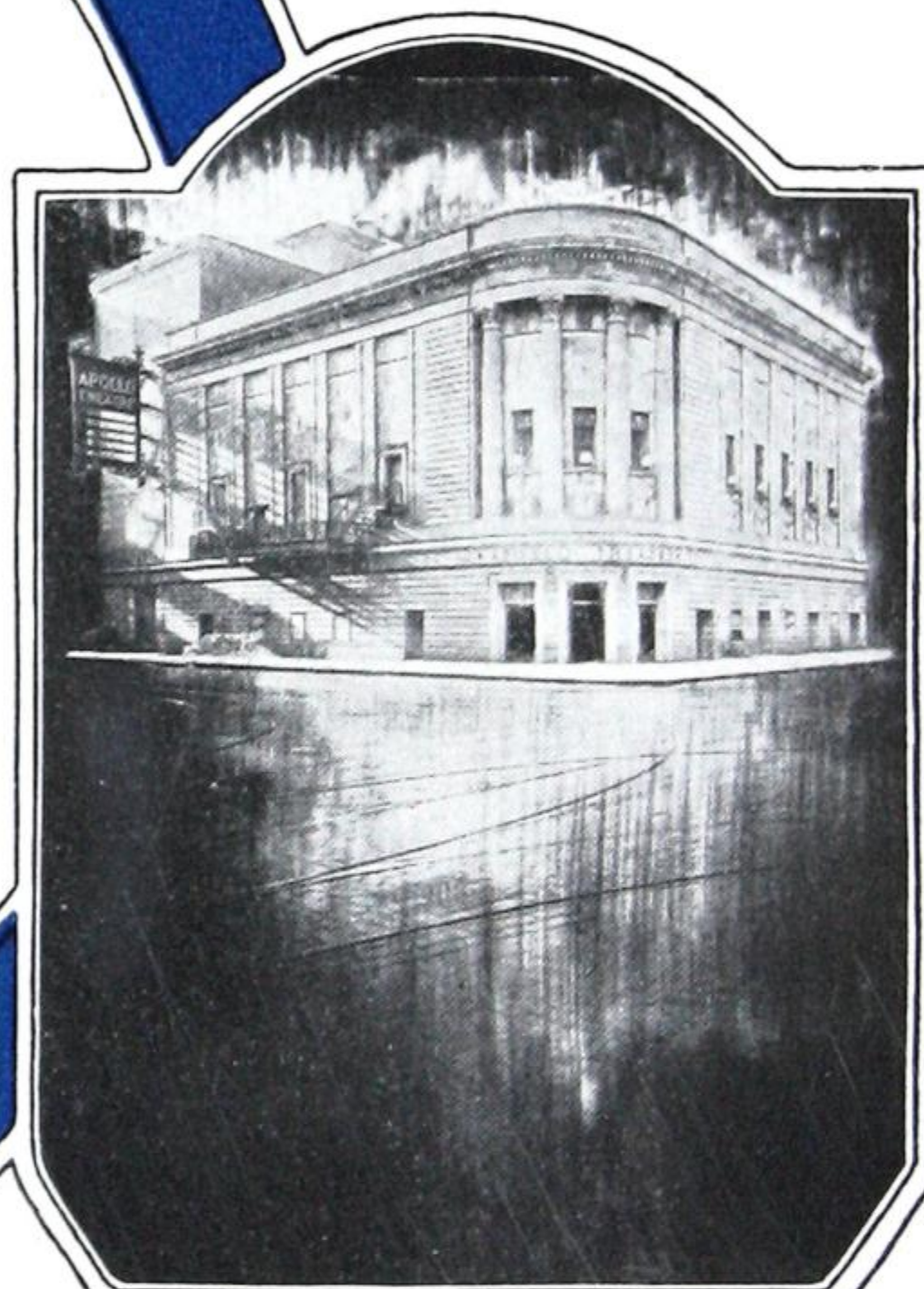
State Theater Minneapolis, Minn.
J. E. O. Pridmore, Architect



Miller Theater,
Wichita, Kansas
C. W. & Geo. L. Rapp,
Architects



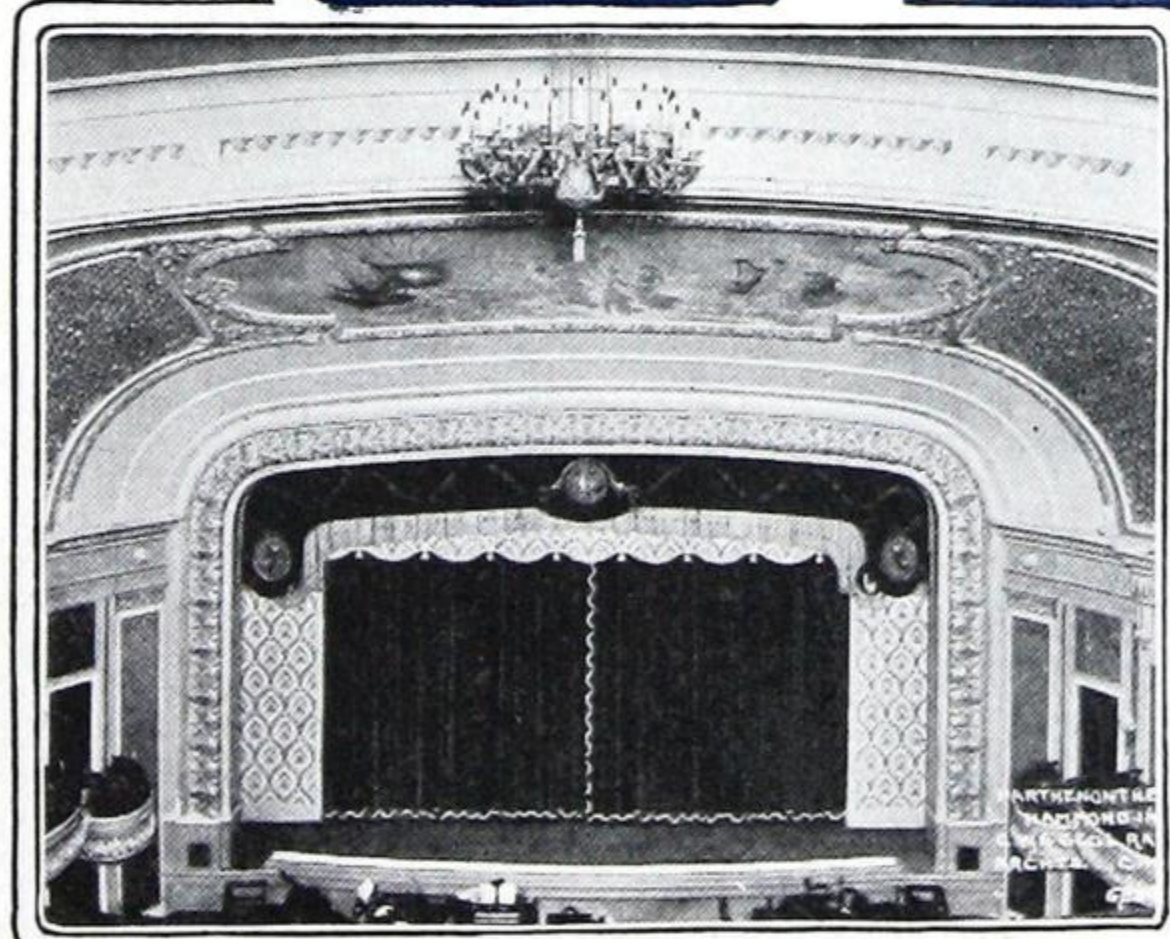
State-Lake Theater Chicago
C. W. & Geo. L. Rapp, Architects



Apollo Theater, Chicago
Holabird & Roche,
Architects



Majestic Theater, Dallas, Texas
John Eberson, Architect



Parthenon Theater
Hammond, Ind.
C. W. & Geo. L. Rapp, Architects



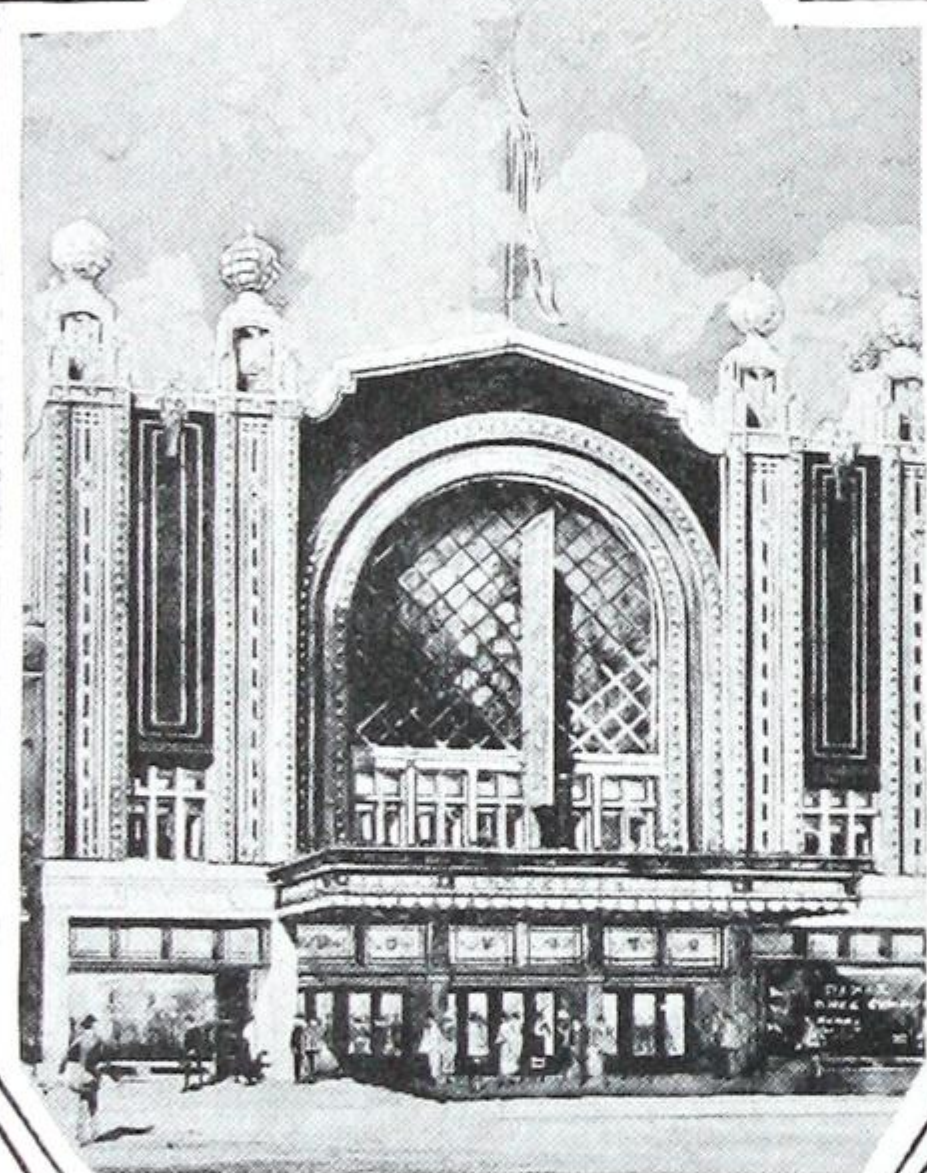
B. F. Keiths Theater Cleveland
C. W. & Geo. L. Rapp, Architects



Mainstreet Orpheum Junior
Theater Kansas City
C. W. & Geo. L. Rapp, Architects



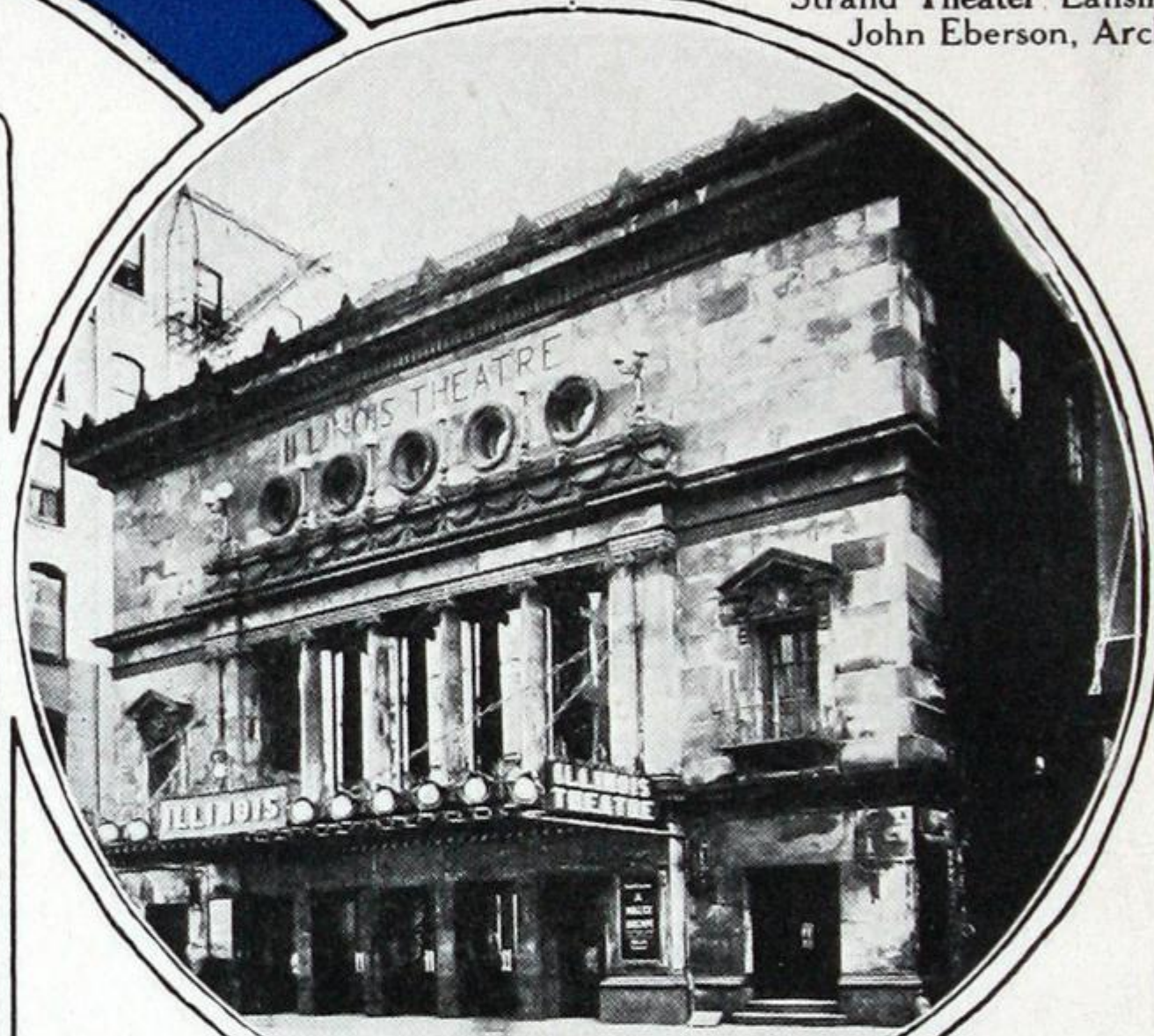
Strand Theater Lansing, Mich.
John Eberson, Architect



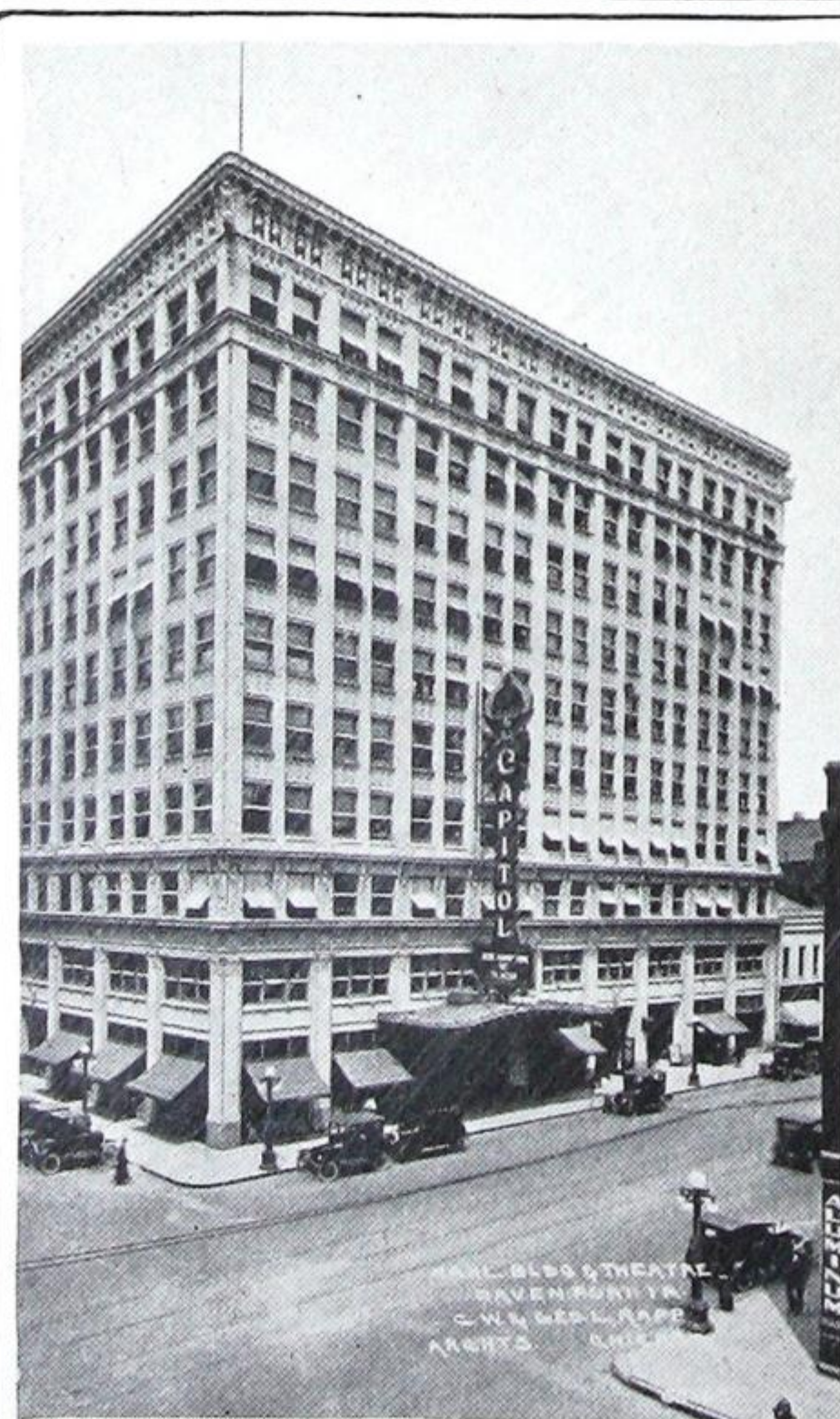
Lincoln-Dixie Theater
Chicago Heights, Ill.
Henry L. Newhouse,
Architect



Tivoli Theater Chicago
C. W. & Geo. L. Rapp, Architects



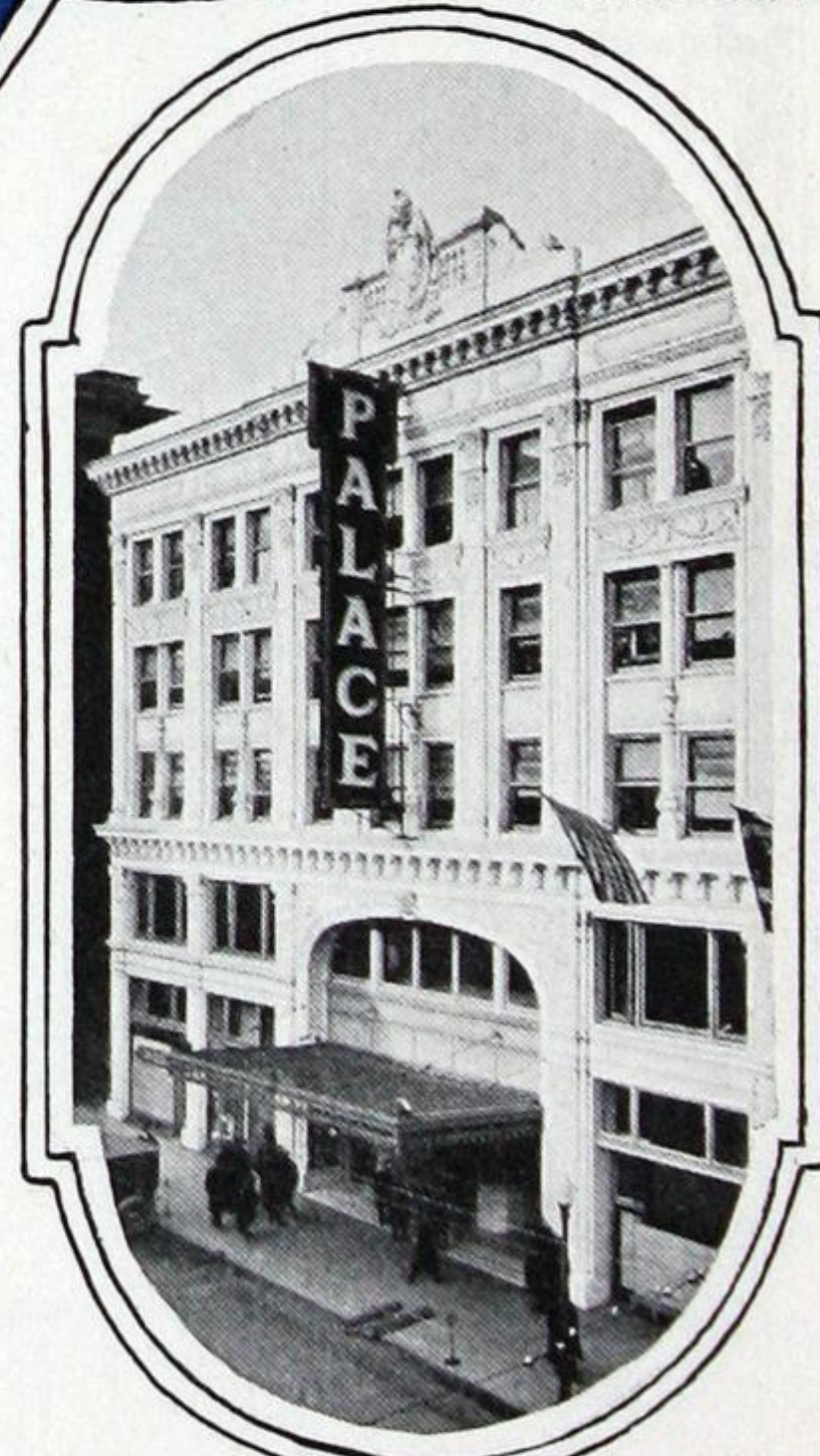
Illinois Theater Chicago
B. H. Marshall, Architect



Capitol Theater Davenport, Ia.
C. W. & Geo. L. Rapp, Architects



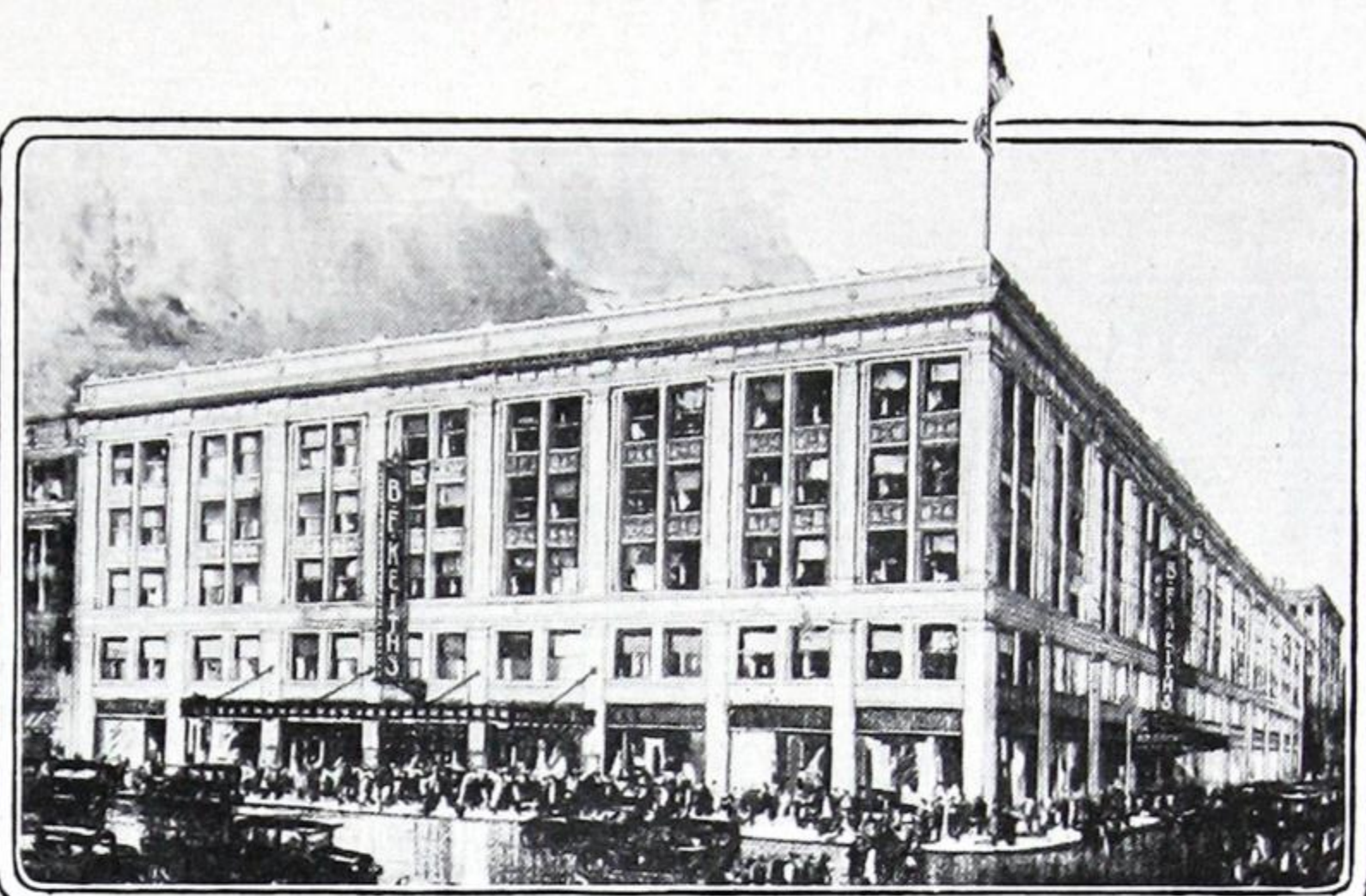
Capitol Theater St. Paul, Minn
C. W. & Geo. L. Rapp, Architects



Palace Theater Cincinnati, Ohio
C. W. & Geo. L. Rapp, Architects



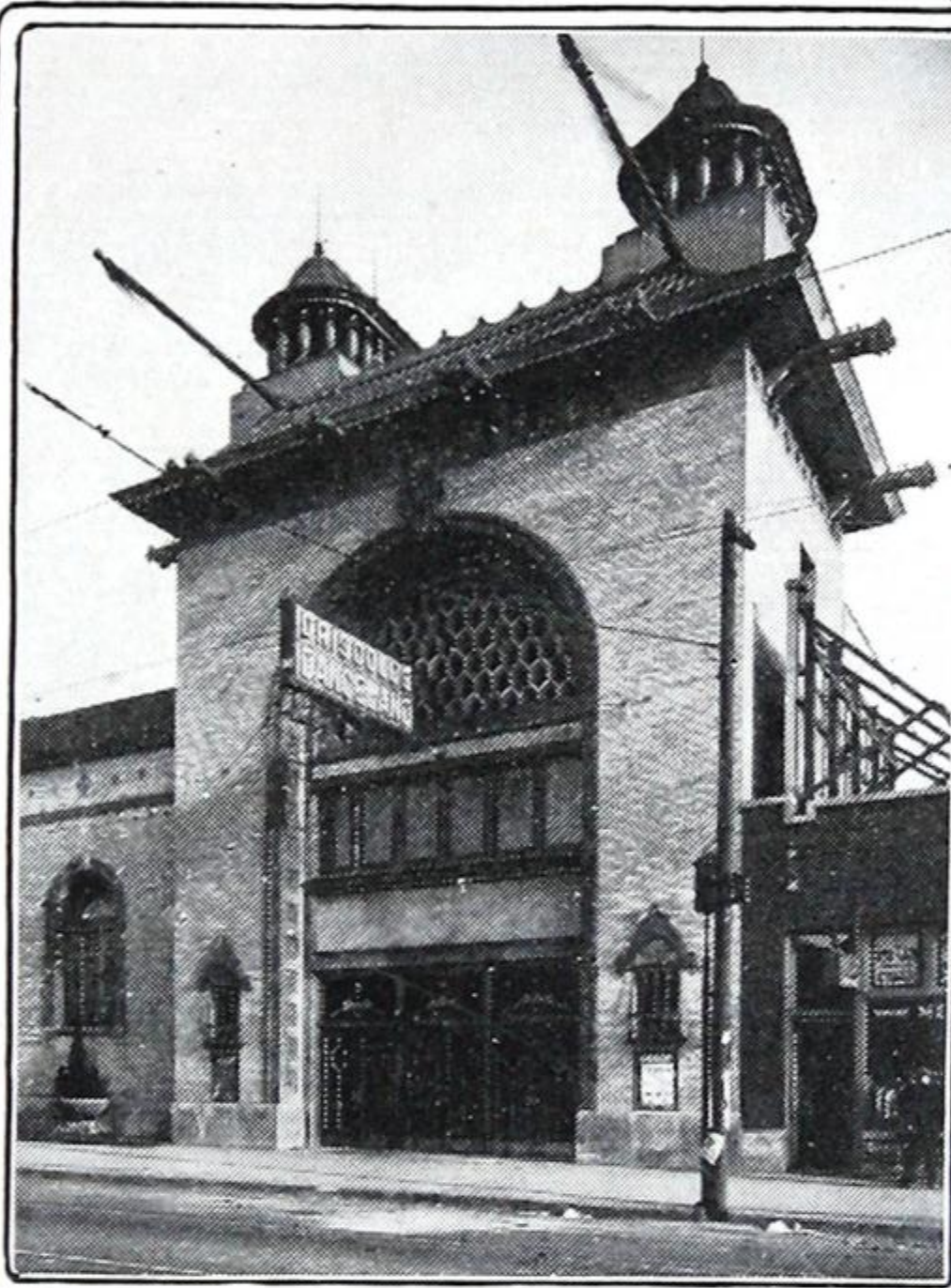
Palace Theater, Peoria, Illinois
J. E. O. Pridmore, Architect



B. F. Keith's Theater Dayton, Ohio
C. W. & Geo. L. Rapp, Architects



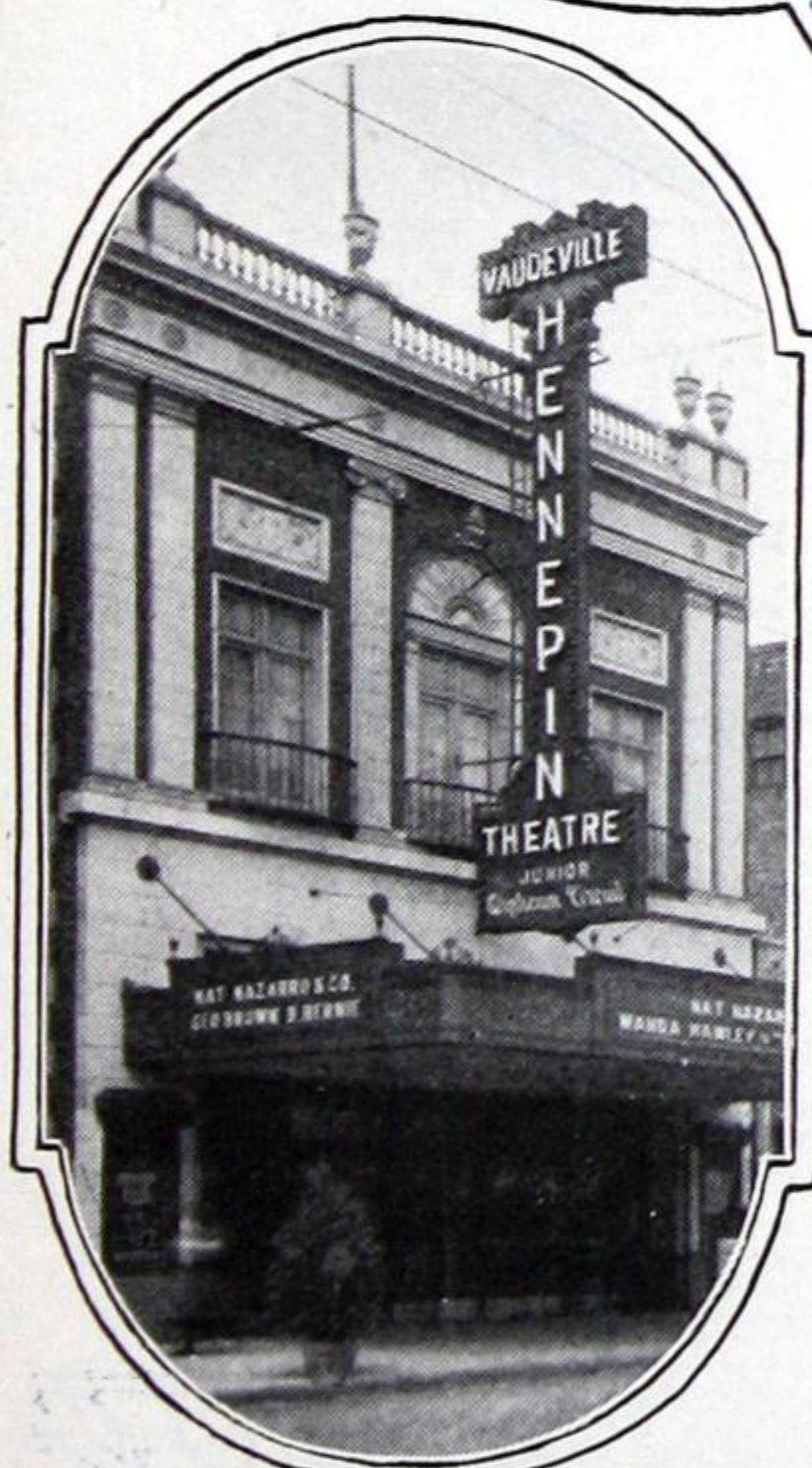
Victory Theater,
Evansville, Indiana
J. E. O. Pridmore Architect



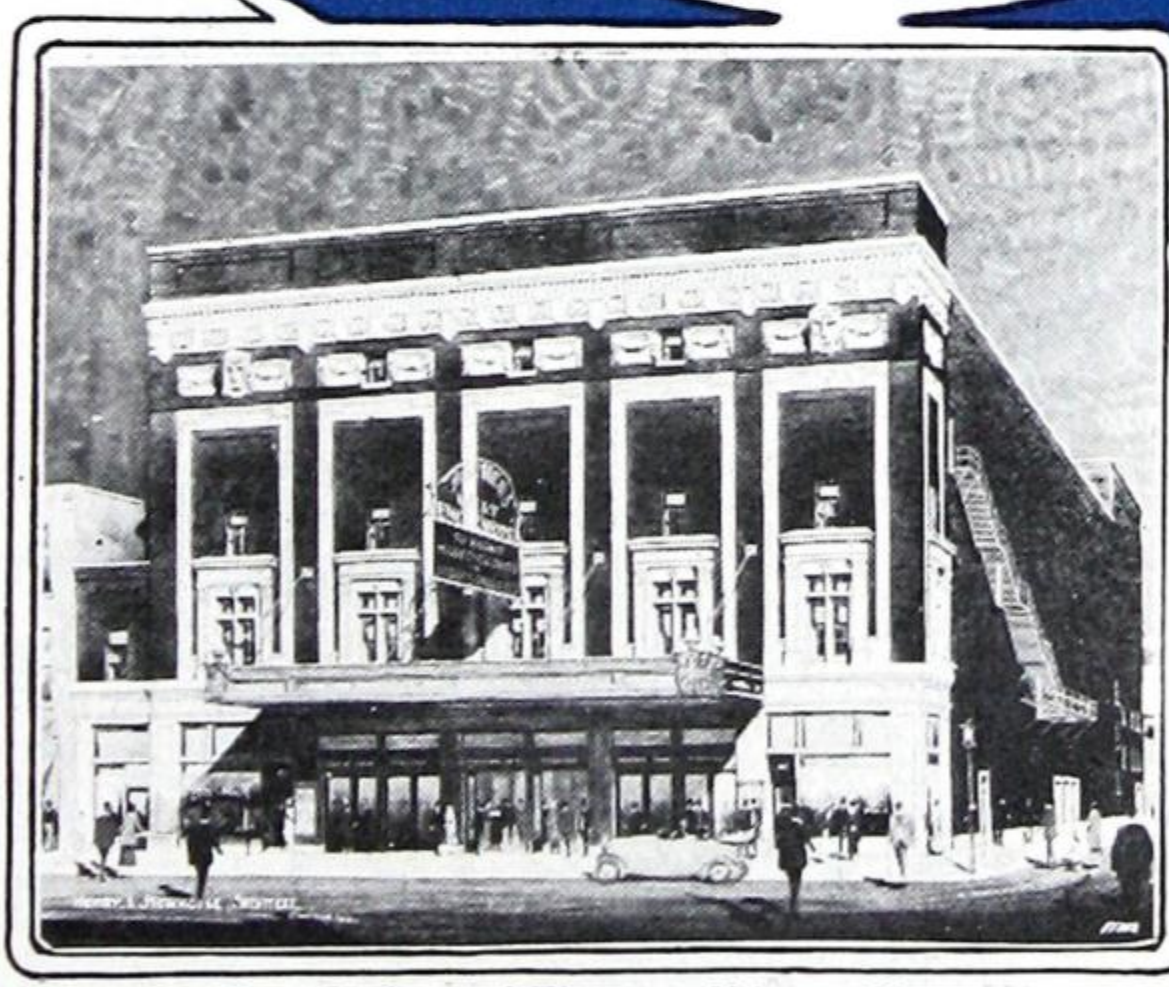
Driscoll's Danceland, Chicago, Illinois
Waltersdorf & Bernhard, Architects



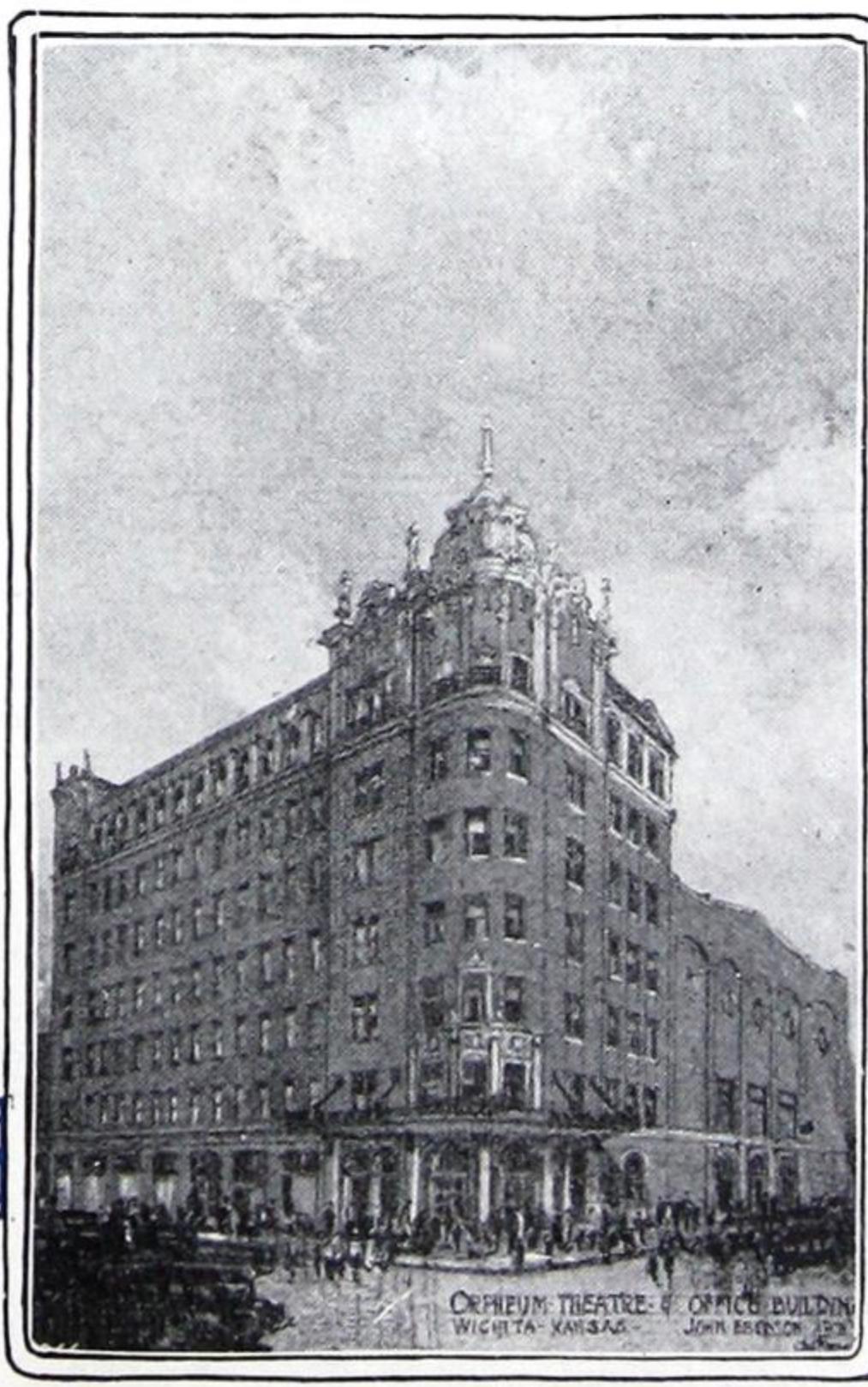
Majestic Theater
Dallas, Texas
John Eberson, Architect



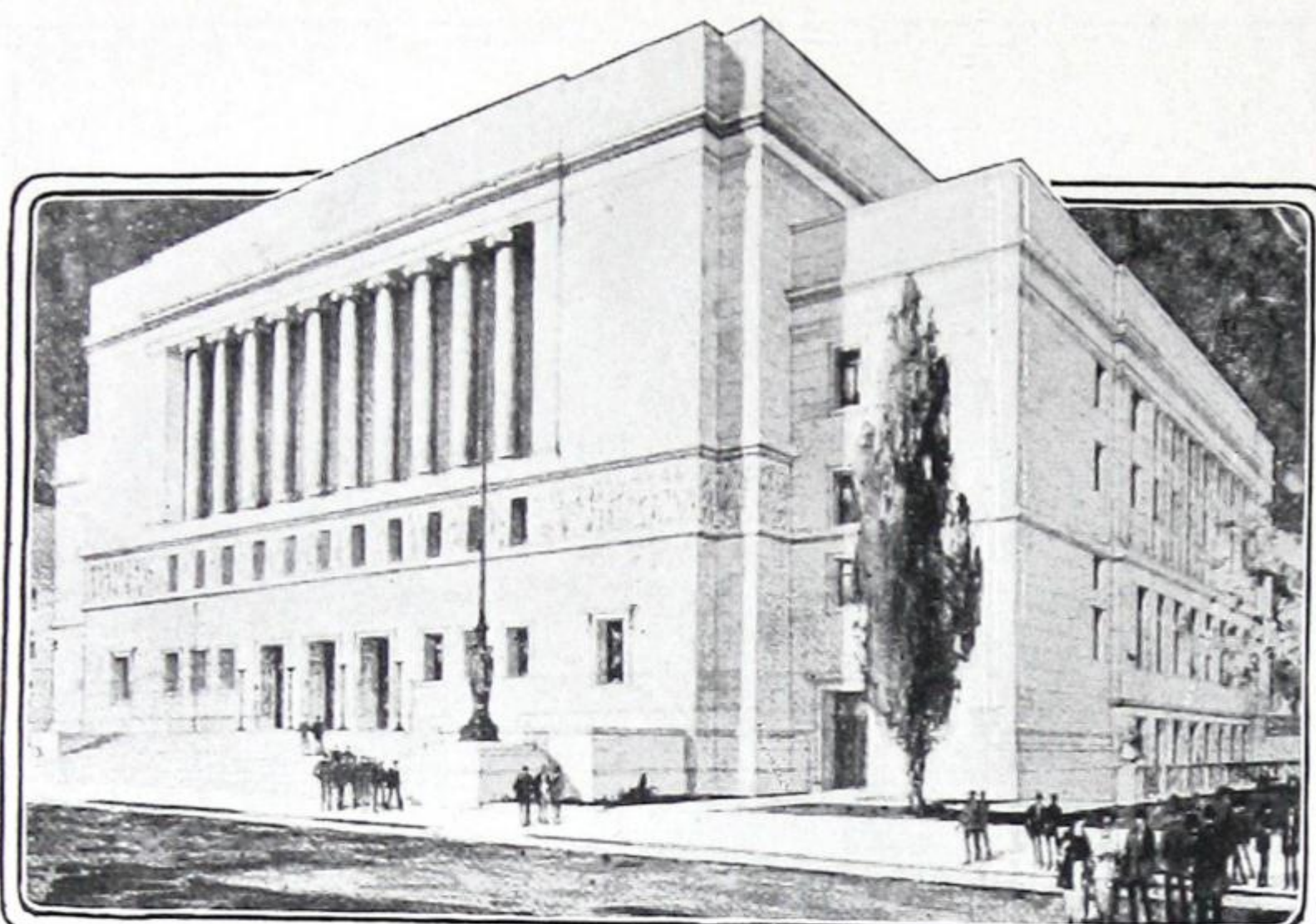
Hennepin Theater, Minneapolis, Minnesota
Kirchoff & Rose, Architects



West Englewood Theater, Chicago, Illinois
Henry L. Newhouse, Architect



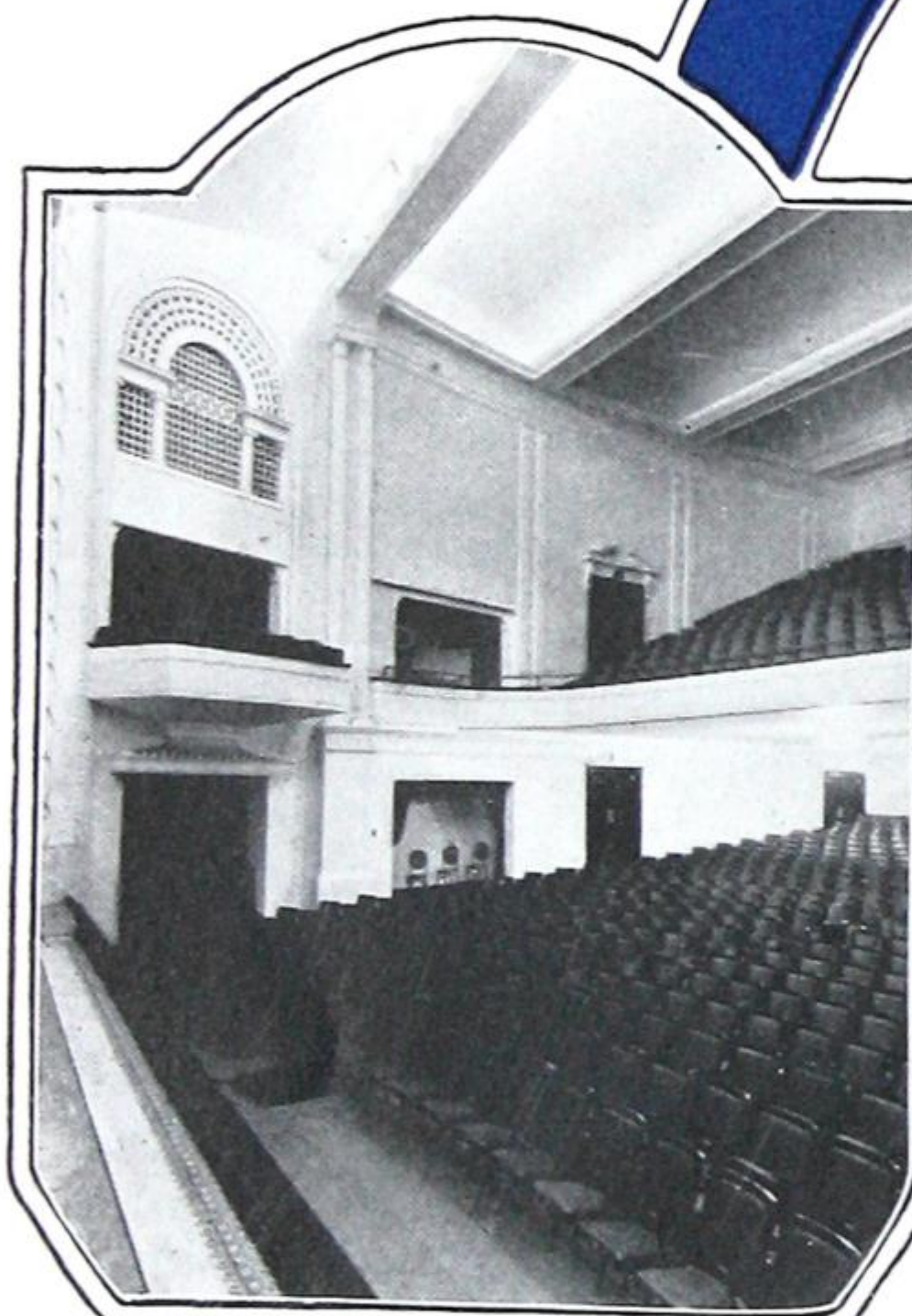
Orpheum Theater, Wichita, Kansas
John Eberson, Architect



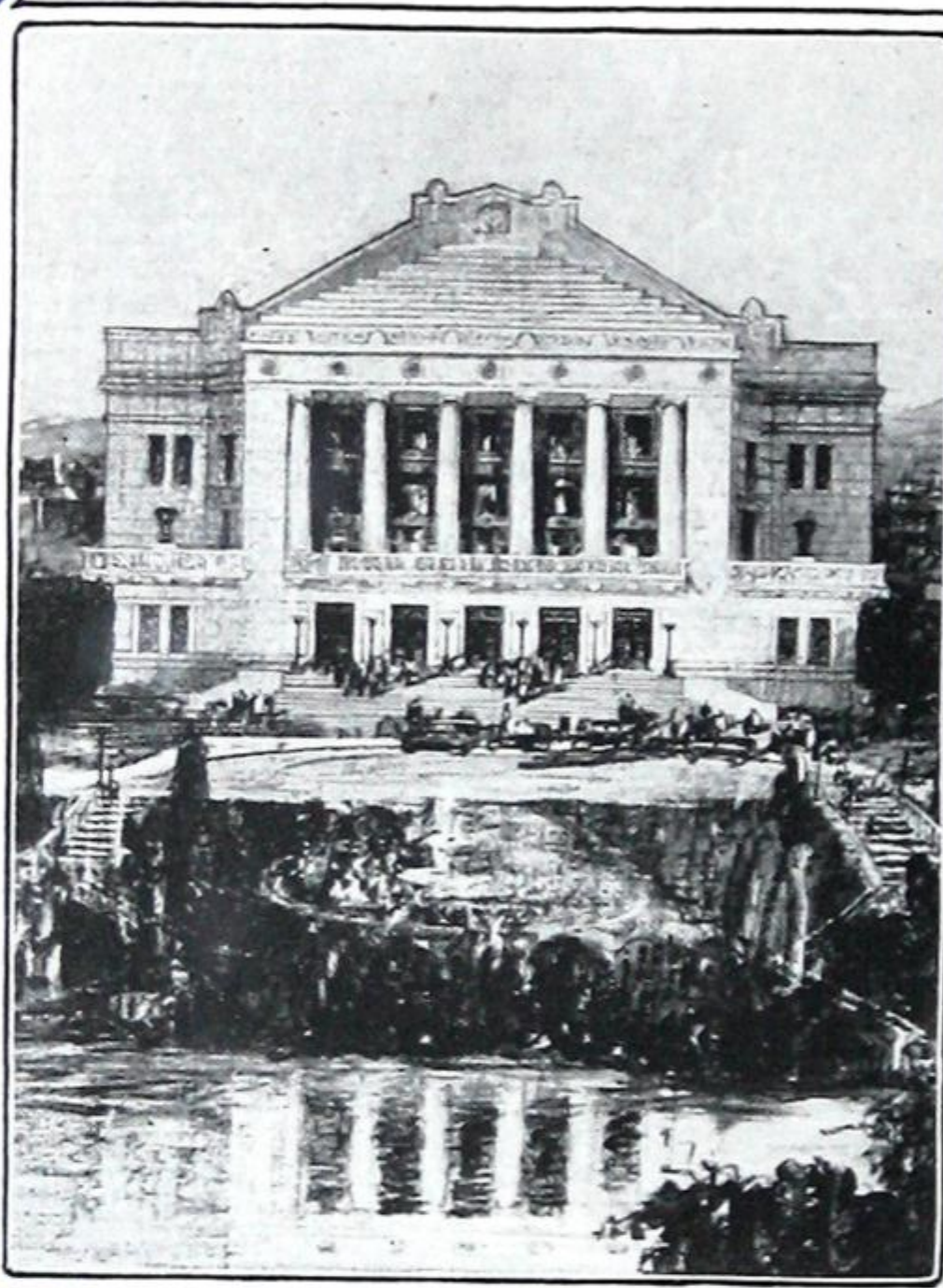
Scottish Rite Cathedral
St. Louis, Missouri
William B. Ittner, Architect



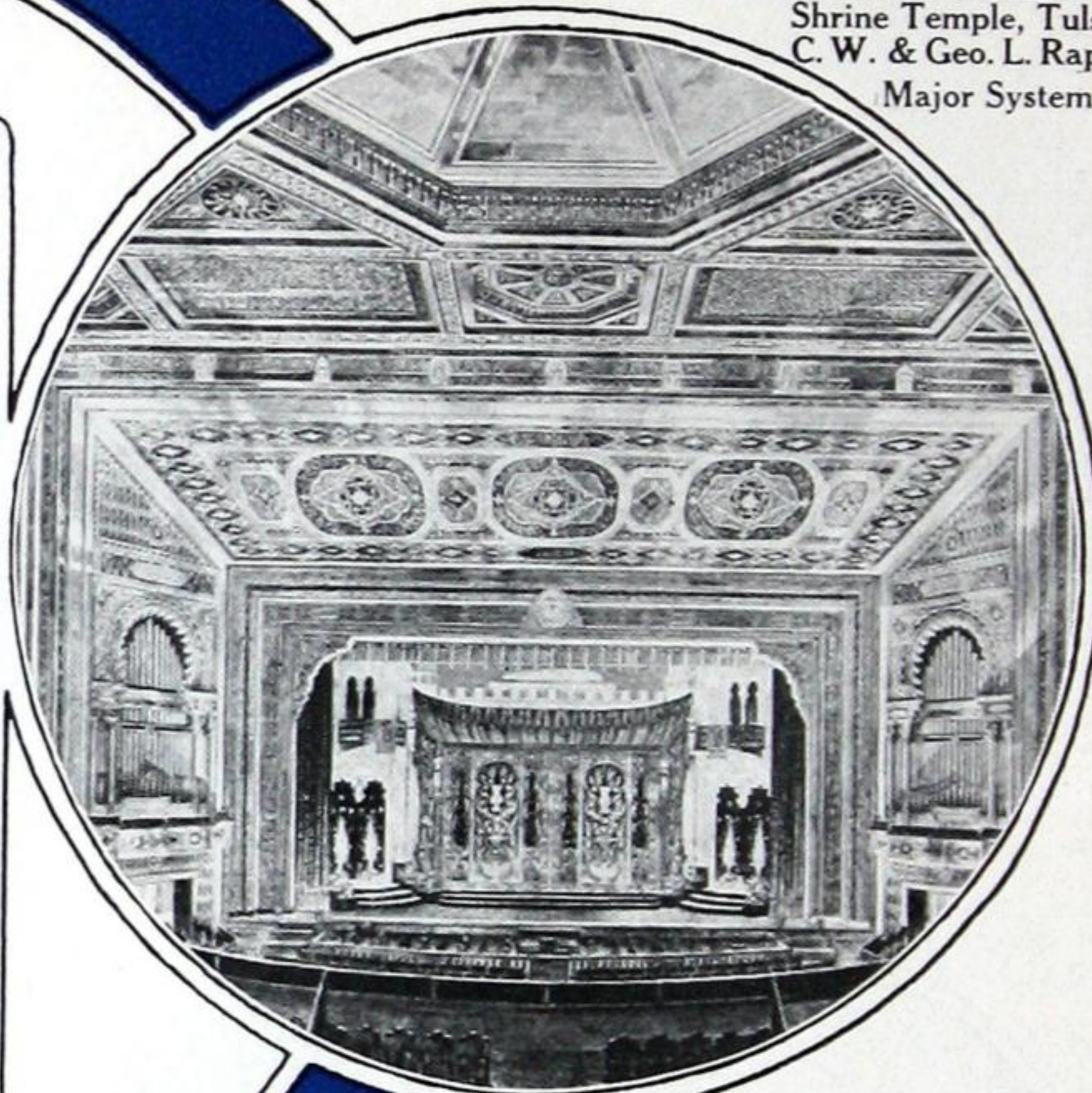
Shrine Temple, Tulsa, Okla.
C. W. & Geo. L. Rapp, Arch.
Major System Spec.



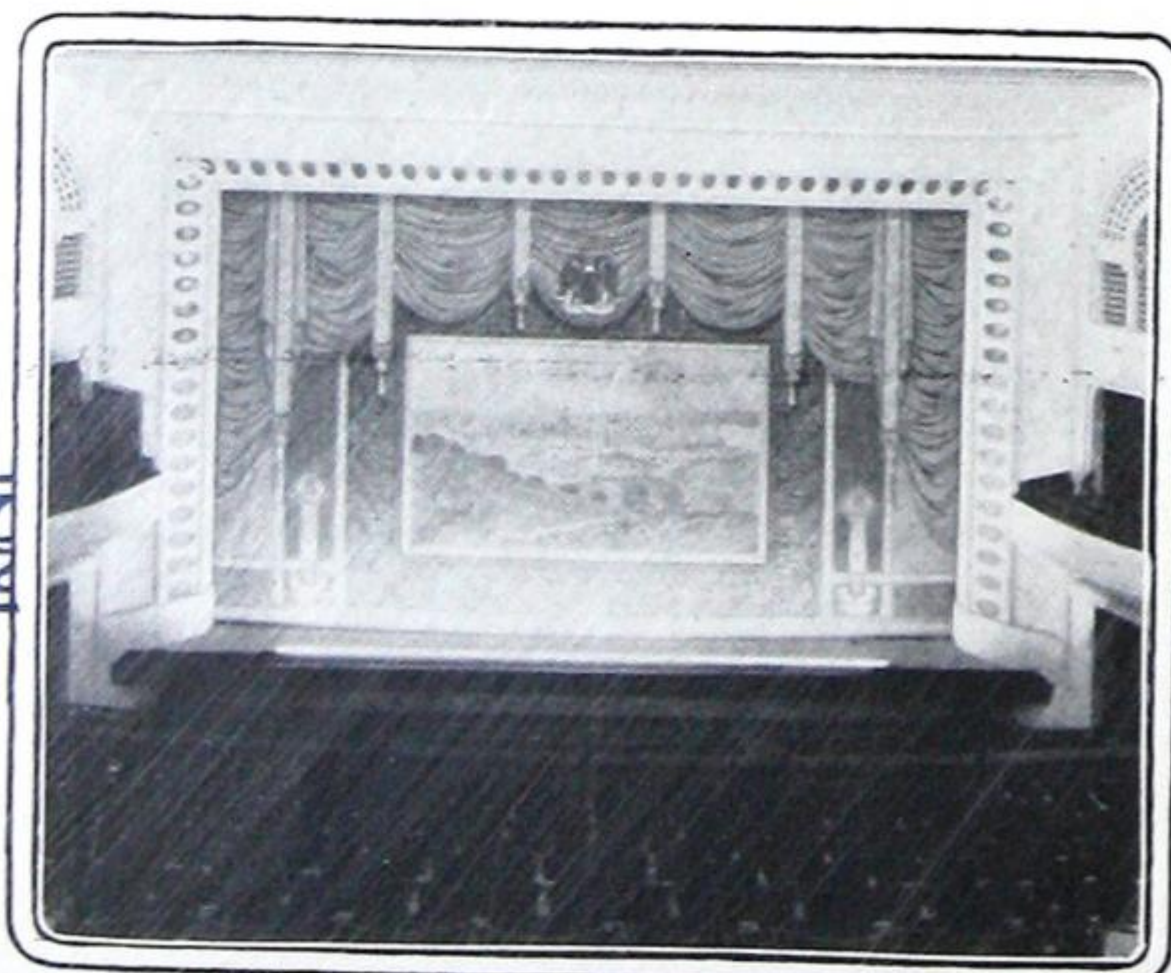
Bloomington Consistory Stage,
Bloomington, Ill.,
R. G. Schmidt, Architect



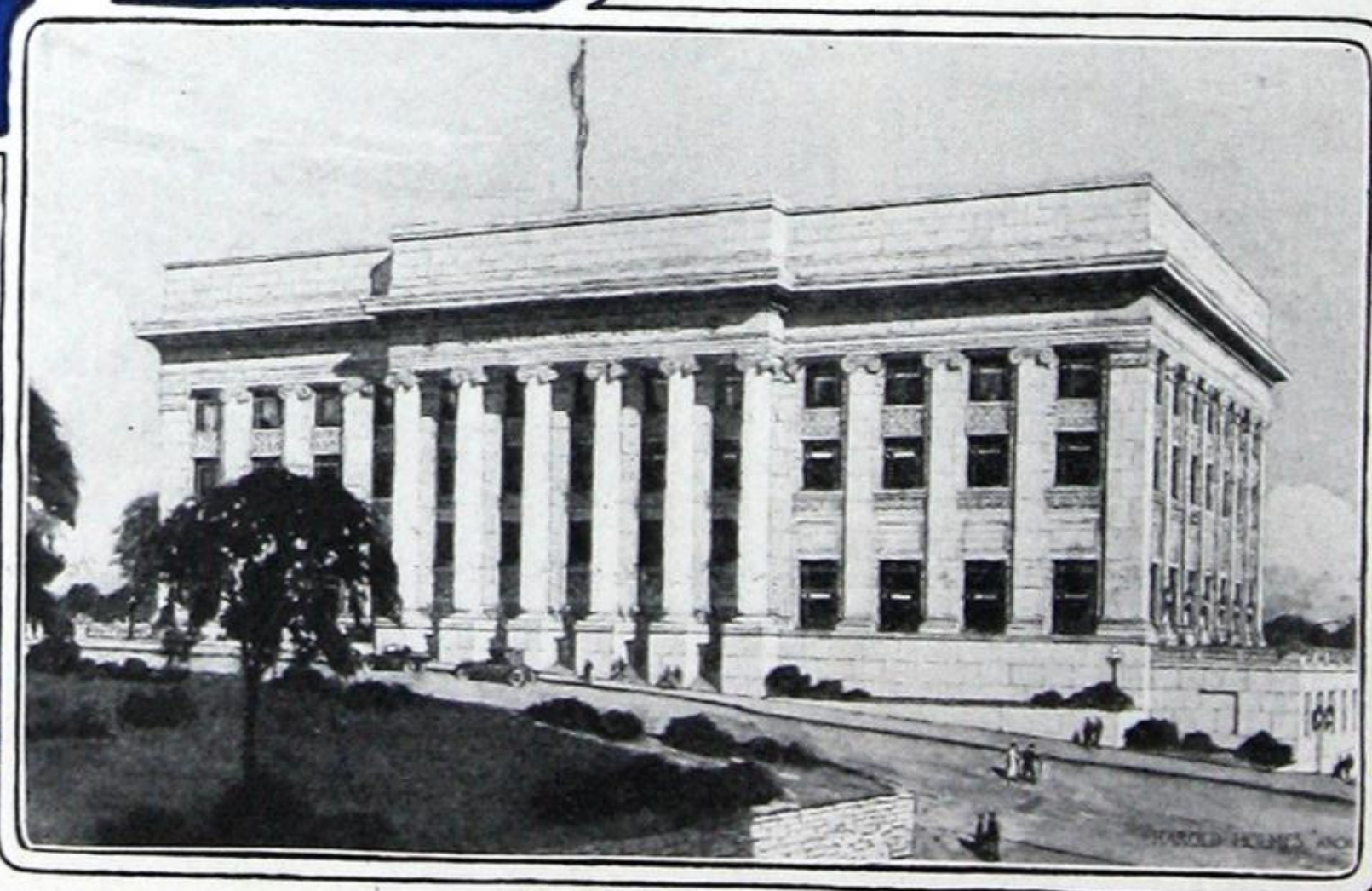
Beni-Kedem Temple-A. A. O.
N. M. S., Charleston, W. Va.
C. W. & Geo. L. Rapp.



Beni-Kedem Temple-A. A. O.
N. M. S., Charleston, W. Va.
C. W. & Geo. L. Rapp, Architects
Major System Specified



Bloomington Consistory
Bloomington, Ill.
R. G. Schmidt, Architect



Scottish Rite Cathedral,
Sioux City, Ia.
Harold Holmes, Architect

Masonic Buildings Welcome Light Control

Major Systems enable the beautifully equipped Masonic Buildings like those illustrated on the opposite page to perform ceremonies and stage theatricals equal to the finest of theaters.

Particularly are the Major System features of safe operation and extended remote control more greatly appreciated in this type of installation; and all of the benefits of Major pre-selection; cumulative control; flashless, noiseless switch operation, and reduced stage area are of high value. With the flexible Major System the lights in both the auditorium and on the stage can be given marvelous blendings, with changes so subtle that light seems to fade like twilight in a northern country or grow bright like dawn on the mountain top. New and more magnificent affairs can be staged, as well as a more vivid interpretation of the ancient ones successfully enacted, with the aid of the Major System of Pre-Selective Remote Control.

Modest Masonic Buildings in the smaller towns can have the same advantages of Major light control as the most elaborate ones in the larger cities because Major Systems are of unit construction and economical installation can be made of any size.

As a representative group, the page opposite gives an idea of the possibilities of Major equipment — smaller Auditoriums successfully competing with the larger. Efficiency and quality in the Major System do not vary in the least with the size.

When the larger seating capacities bring together huge crowds the danger from fire and panics grows in proportion. The possibility of fire must be eliminated—the Major System puts all of the heavy current switches in a fireproof room or steel cabinet in the basement — entirely away from the stage—the Major pilot board switch needs less capacity than the average lamp socket.

Panic hazard—more dangerous and difficult to combat, is eliminated by instant light right where the disturbance starts. Fear comes in the dark and vanishes with light. The Major extended remote control enables the entire auditorium and stage or any portion of either to be turned on at any desired number of points throughout the auditorium. An usher or attendant can thus be a safety factor in control of any situation. The push button switches are enclosed in glass front boxes to prevent accidental use—yet always ready for emergencies.

Major Systems can be installed in Shrine Temples that have been in use for years, as well as those under construction, and the same results attained. The modernizing of beautiful Masonic Buildings built long ago can be accomplished at a surprisingly small cost.

The master of ceremonies can hold a small push button switch in his hand anywhere on the stage and turn the lights off and on at will—at the exact moment desired. This is possible only with the Major System.

Schools and Colleges

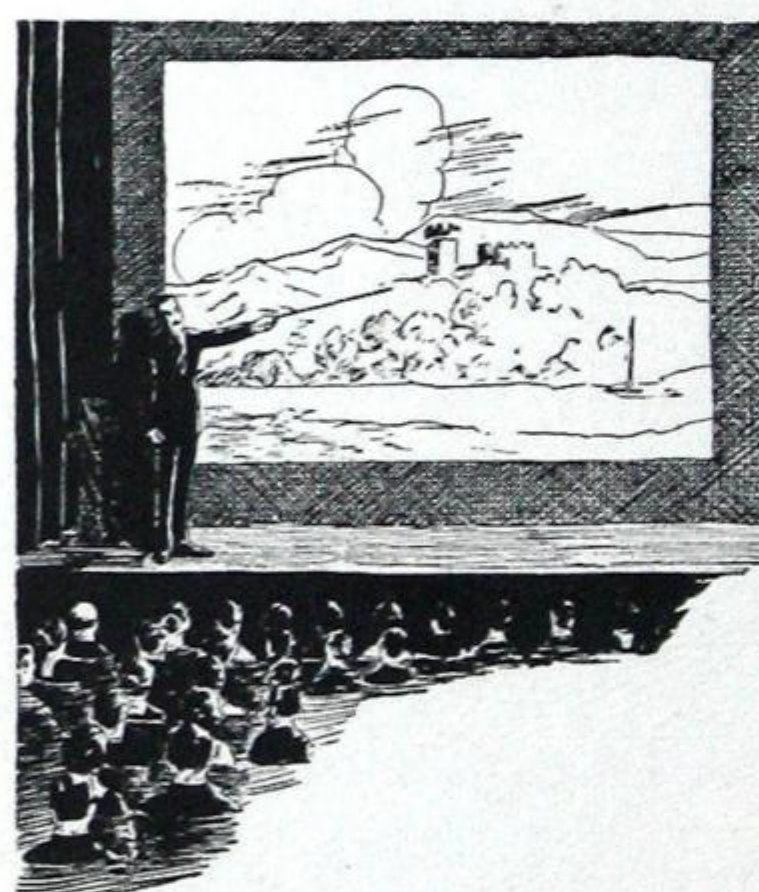
The trend of present day education requires an auditorium in most any school or college of considerable size. In these stage equipped auditoriums, lectures, historical pageants, amateur theatricals and other activities give the student a wider horizon and increase the value of the institution.

The Major System of Light Control is the most practical and the safest switchboard to use where students can come in contact with or operate the lighting apparatus. Consider that the Major System can not do injury or be injured by the most careless or ignorant operator and can be locked with any combination of lighting on so that no mischievous finger can tamper with it. Absolute safety is not confined to the person or persons actually at the Major switchboard, but for the mass of students in the audience as well. The elimination of fire possibilities is paramount and the common type of electrical switchboard is a danger spot for the starting of fires. With the Major System all heavy current switches are located in a fireproof, locked steel cabinet or room, away from all contact with inflammable material. Should a fire start from other causes the entire auditorium can be lighted with a touch of a button from a dozen or more points throughout the hall and the lights will remain lit until actually put out by flames. This cannot be said about any other kind of installation. With the open switchboard on the stage, the minute water strikes it the fuses blow and the lights go out, usually when most needed.

However, a more common danger, where a crowd of people gather, is a

panic. Panics start sometimes from trivial incidents and aided by darkness, fear seizes the girls and boys until serious trouble ensues. Light dissipates fear, so that when the extended remote control of the Major System is operated, the incident remains an incident and is forgotten.

Motion Pictures are a great educational force and arrangements for temporary or permanent motion picture machines are found in nearly every school auditorium. With the Major System, a motion picture performance is aided by the fact that the operator can turn the auditorium lights on and



off at will, thus co-ordinating the program. Should a lecturer use motion or stereoptican pictures, he can hold or have in his stand a simple push button

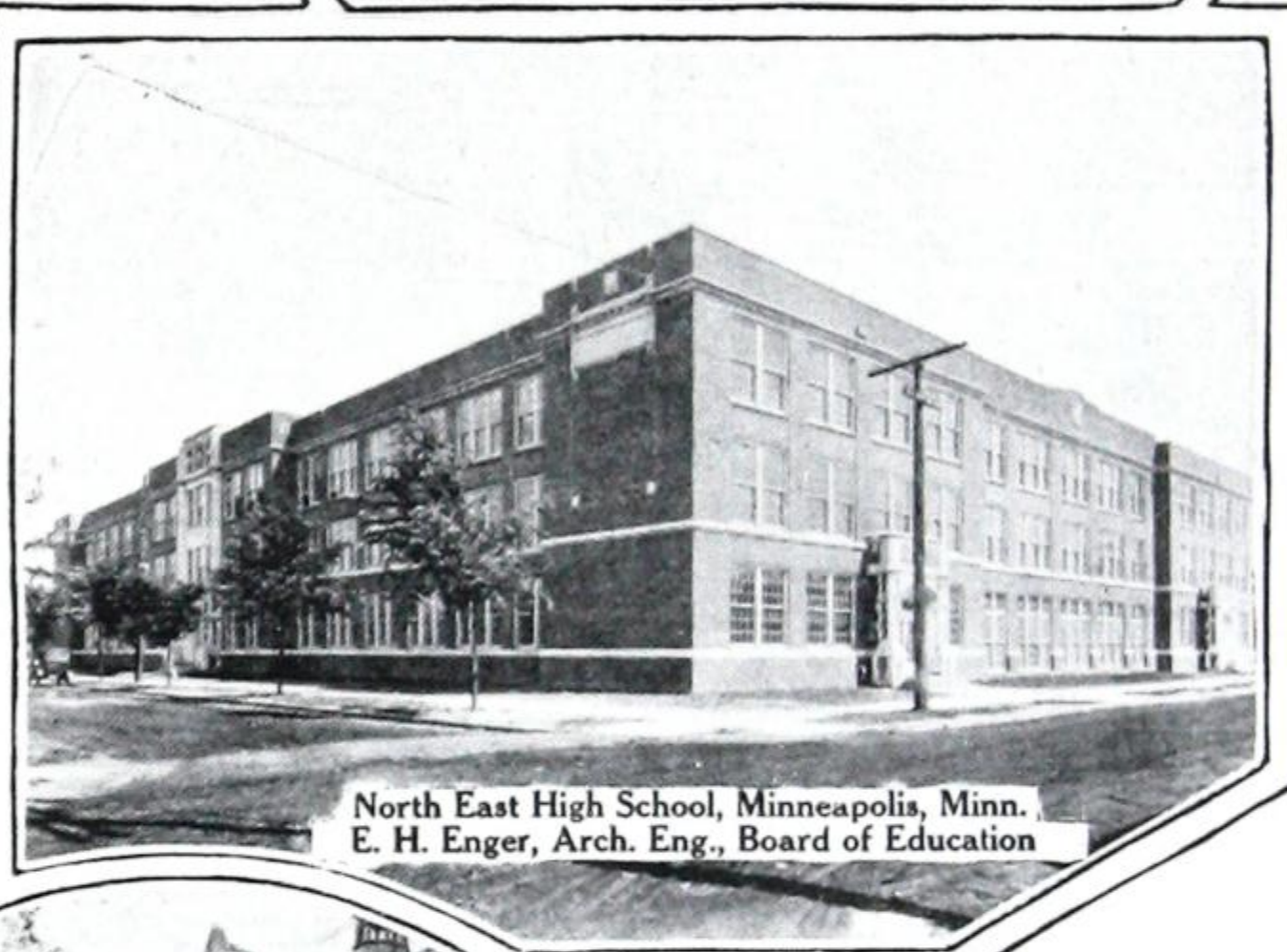
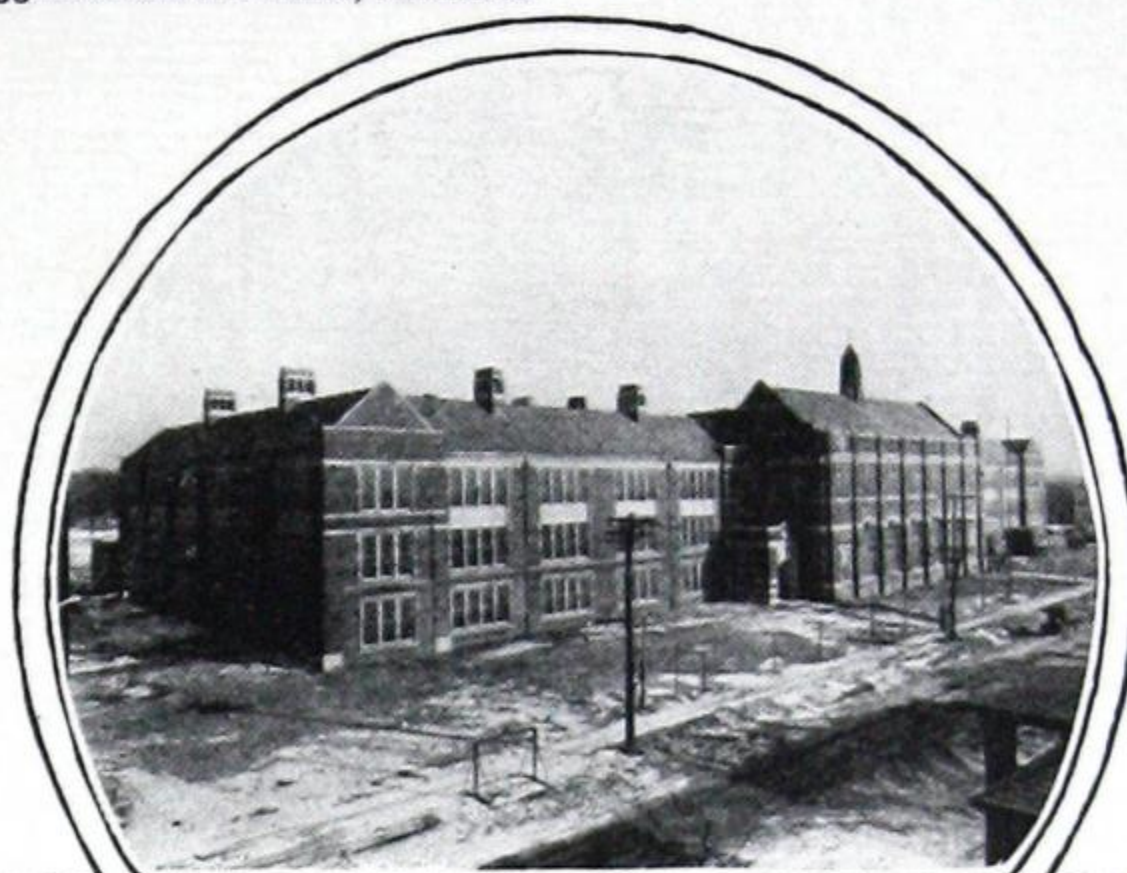
switch that turns the lights on or off as he requires, doing away with irritating delays and interruptions, and giving a continuity to his talk that is necessary to its success.

Among the technical schools the natural effort is to teach the most modern development in every branch. It seems logical that the most modern system of lighting control should be installed where it can not only serve the purpose for which it was designed but also afford an inspirational study of practical application of electrical principles. The Major System has been in use a sufficient number of years to firmly establish the correctness of its basic

principles and is considered by many of the country's leading electrical engineers to be the best system of theater lighting control in existence.

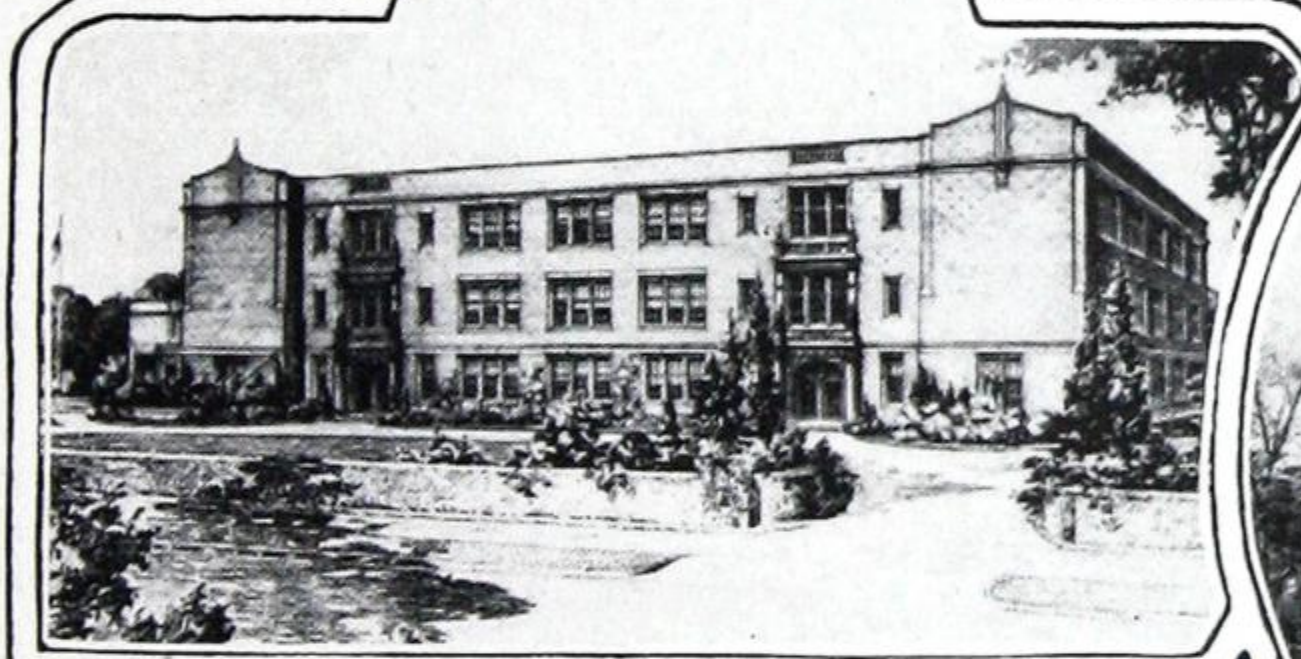
From this angle, we might also consider the continued modernism of school and college buildings. Since every other method of stage and auditorium lighting control is incomplete and lacking in correct design it is apt to be of a passing era. Care should be exercised in selecting equipment that will be modern for at least ten to fifteen years from now, as well as give full service during its life.

Hutchins Jr. High School, Detroit, Mich.
Malcolmson, Higginbotham & Palmer, Architects



North East High School, Minneapolis, Minn.
E. H. Enger, Arch. Eng., Board of Education

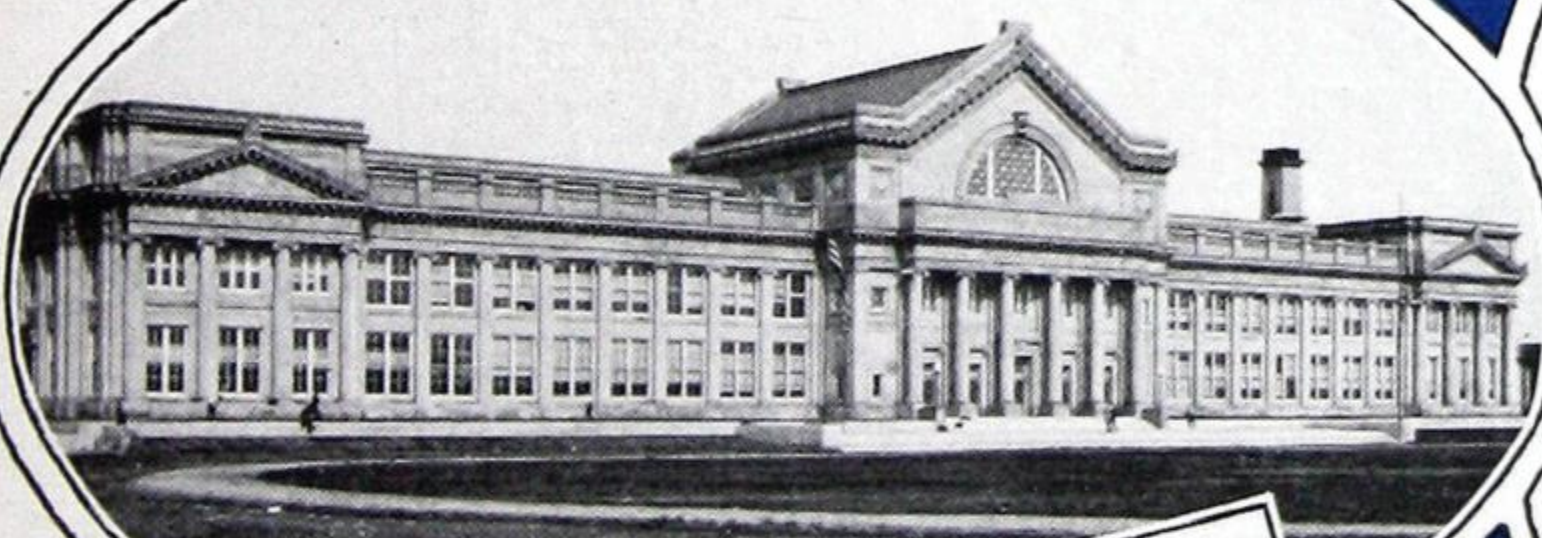
Aurora High School, Aurora, Minnesota
Tyrie & Chapman, Architects



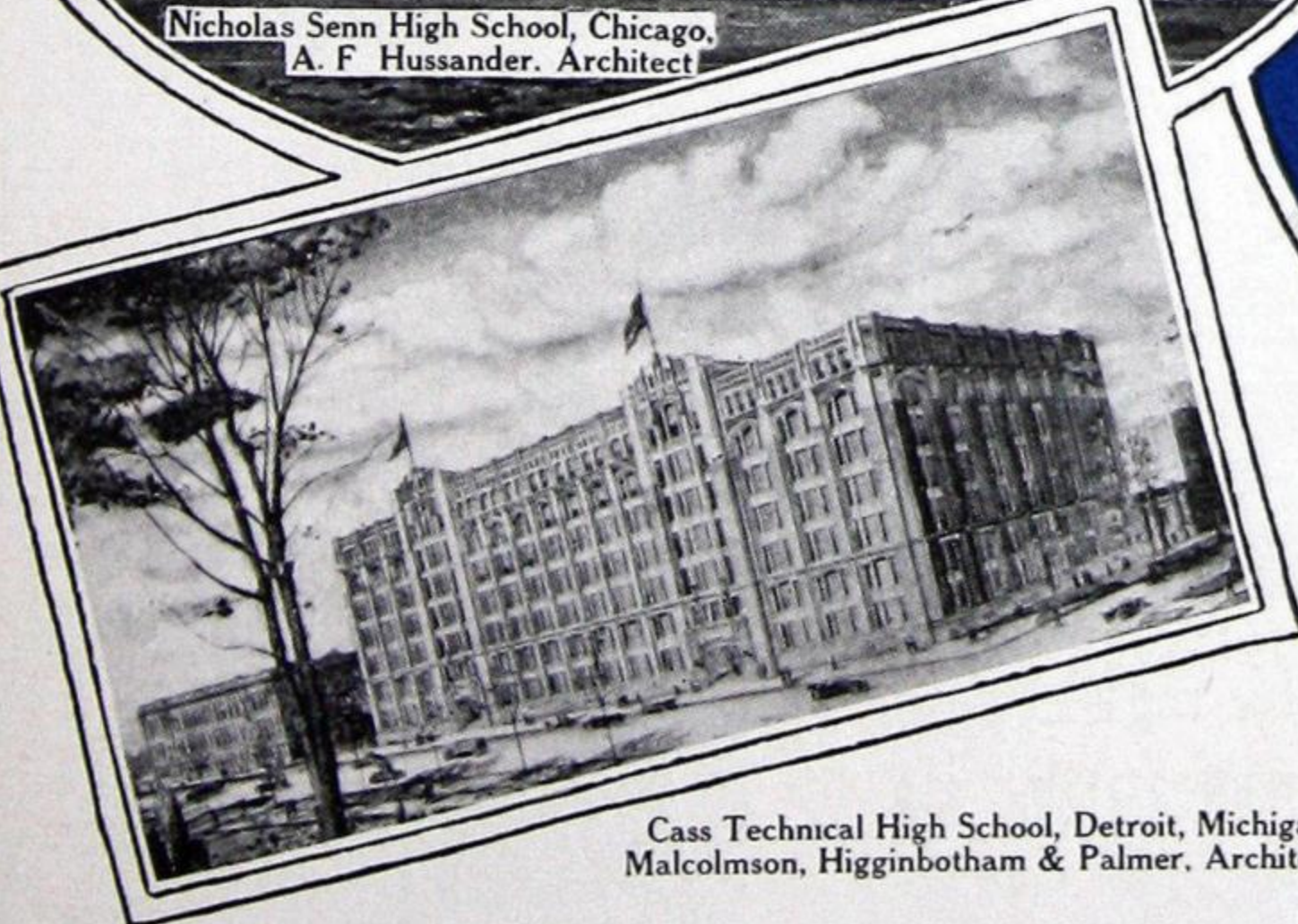
Central High School,
Bay City, Michigan
Perkins, Fellows & Hamilton,
Architects



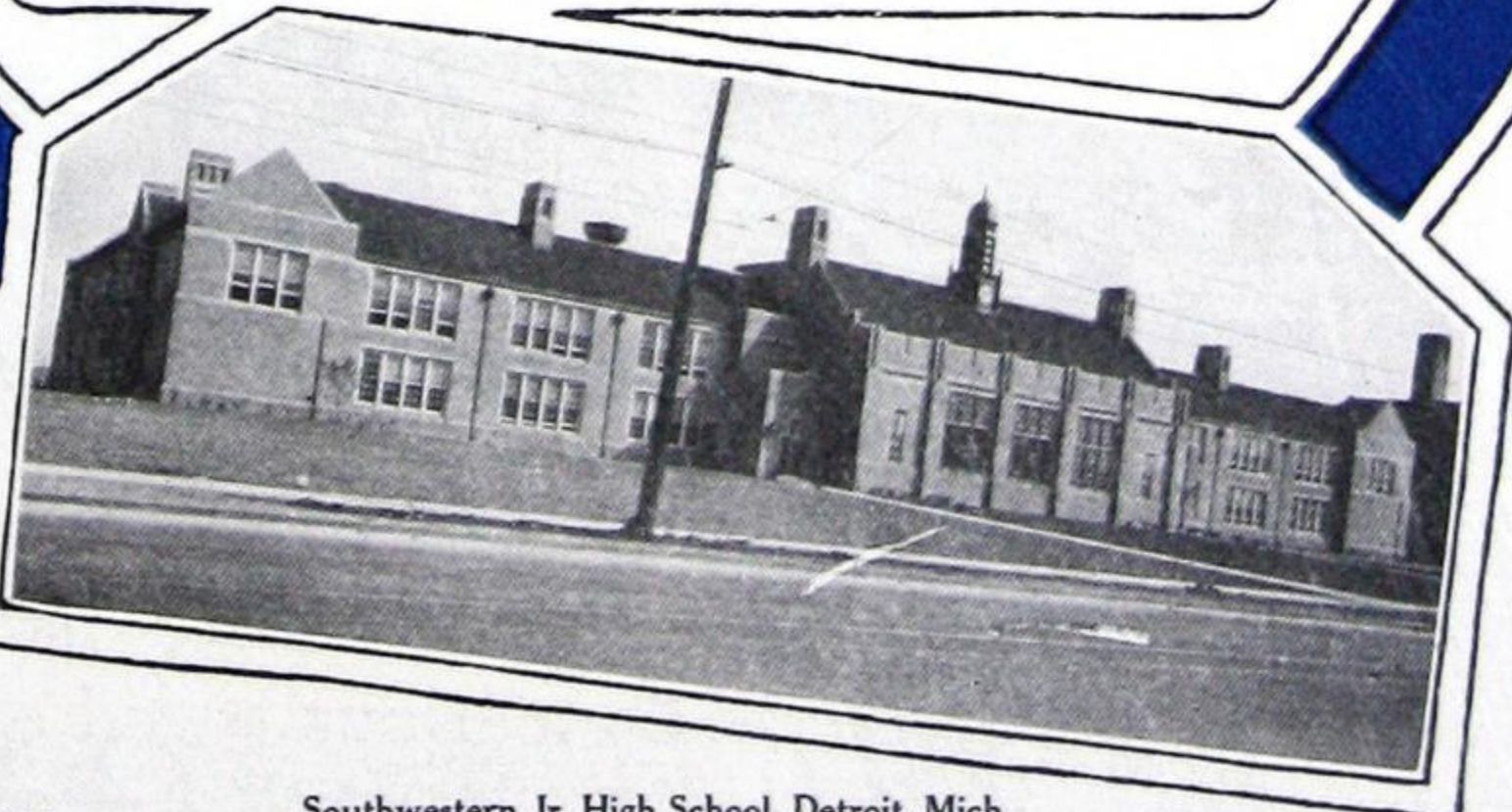
Music Hall, University of Minnesota
C. H. Johnston, Architect



Nicholas Senn High School, Chicago,
A. F. Hussander, Architect



Cass Technical High School, Detroit, Michigan
Malcolmson, Higginbotham & Palmer, Architects



Southwestern Jr. High School, Detroit, Mich.
Malcolmson, Higginbotham & Palmer, Architects

SUBJECT:- STANDARD LAYOUT FOOTS, BORDERS, POCKETS & ETC. FOR MAJOR SYSTEM.

NOTE:- FOR 4 COLOR THESE LAMPS
TO ALTERNATE WHITE
AND AMBER

WIDTH OF PROSCENIUM ARCH IN "	AND AMBER							3 COLOR					4 COLOR				
	"F" IN FEET	50 WATT. CLEAR LAMPS 3" C.T.O.C.	WHITE FOOTS TOTAL WATTS	50 WATT. RED LAMPS 6" C.T.O.C.	RED FOOTS TOTAL WATTS	50 WATT. BLUE LAMPS 6" C.T.O.C.	BLUE FOOTS TOTAL WATTS	"B" IN FEET	"F" IN FEET	300 W. WORK LTS.	WATTS PER COLOR	300 W. LAMPS PER COLOR	"B" IN FEET	"F" IN FEET	300 W. WORK LTS.	WATTS PER COLOR	300 W. LAMPS PER COLOR
20	16	64	3200	32	1600	32	1600	16	2	1	1500	5	17	1½	1	1200	4
25	21	84	4200	42	2100	42	2100	19	3	1	1800	6	21	2	1	1500	5
30	25	100	5000	50	2500	50	2500	22	4	1	2100	7	25	2½	1	1800	6
35	30	120	6000	60	3000	60	3000	25	5	1	2400	8	29	3	1	2100	7
40	34	136	6800	68	3400	68	3400	28	6	1	2700	9	33	3½	1	2400	8
45	39	156	7800	78	3900	78	3900	34	5½	1	3300	11	37	4	1	2700	9
50	43	172	8600	86	4300	86	4300	37	6½	1	3600	12	41	4½	1	3000	10
55	48	192	9600	96	4800	96	4800	44	5½	2	4200	14	46	4½	2	3300	11
60	52	208	10400	104	5200	104	5200	47	6½	2	4500	15	50	5	2	3600	12
65	57	228	11400	114	5700	114	5700	53	6	2	5100	17	54	5½	2	3900	13
70	62	248	12400	124	6200	124	6200	59	5½	2	5700	19	58	6	2	4200	14
75	67	268	13400	134	6700	134	6700	62	6½	2	6000	20	62	6½	2	4500	15
80	71	284	14200	142	7100	142	7100	68	6	2	6600	22	66	7	2	4800	16
85	76	304	15200	152	7600	152	7600	74	5½	2	7200	24	74	5½	2	5400	18
90	80	320	16000	160	8000	160	8000	80	5	2	7800	26	78	6	2	5700	19
95	84	336	16800	168	8400	168	8400	83	6	2	8100	27	82	6½	2	6000	20
100	84	336	16800	168	8400	168	8400	86	7	2	8400	28	86	7	2	6300	21

Used with the diagram to the right, this table gives an accurate assembly of dimensions based on proscenium opening. This is standard practice, subject to the variations of individual stages.

[illegible]

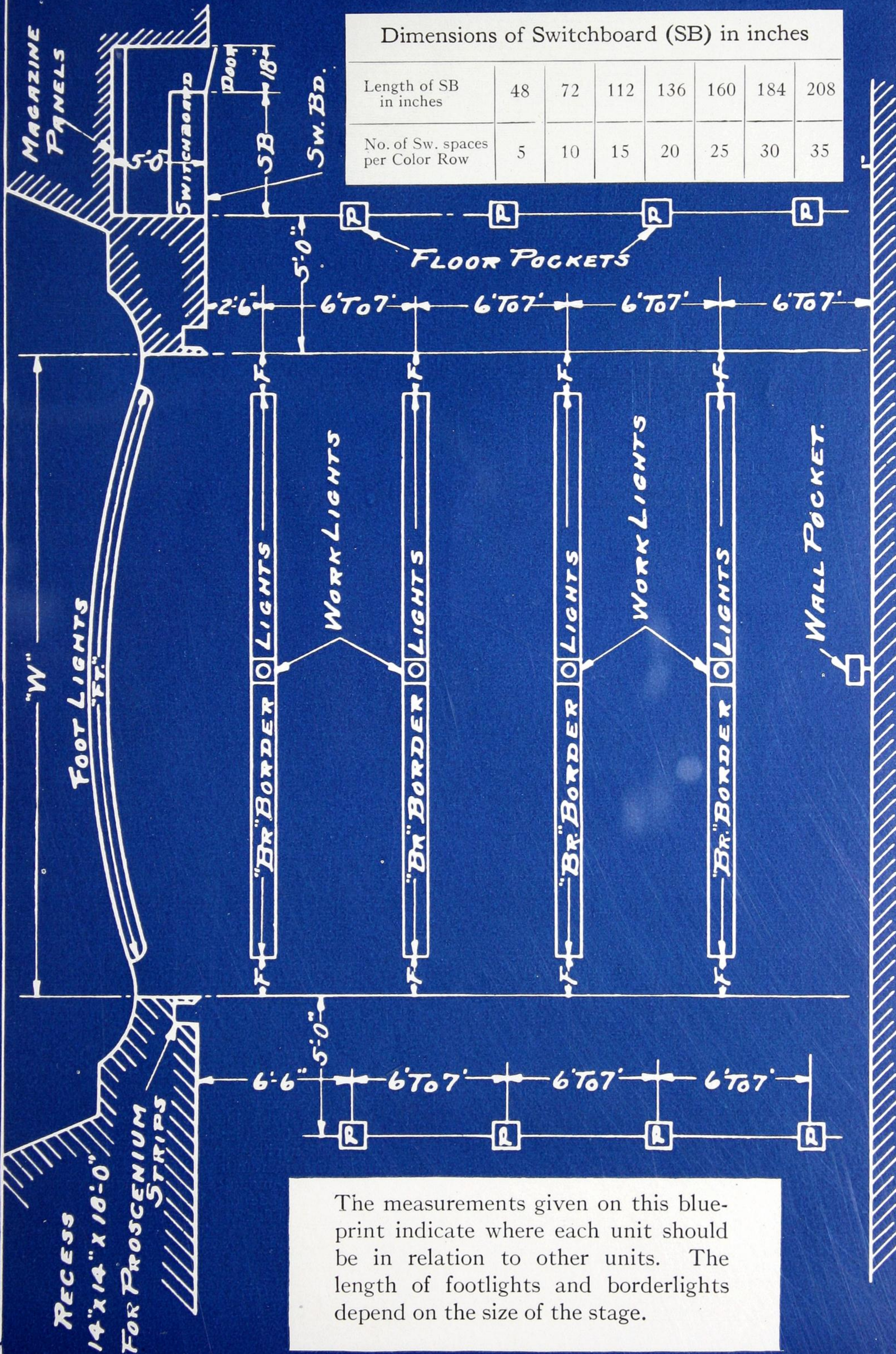
SUBJECT:- STANDARD LAYOUT FOOTS, BORDERS, POCKETS & ETC. FOR MAJOR SYSTEM.

NOTE:- FOR 4 COLOR THESE LAMPS
TO ALTERNATE WHITE
AND AMBER

ALTERNATE WHITE AND AMBER								3 COLOR					4 COLOR				
WIDTH OF PROSCENIUM ARCH "W"	"F" IN FEET	50 WATT. CLEAR LAMPS 3" C.T.O.C.	WHITE FOOTS TOTAL WATTS	50 WATT. RED LAMPS 6" C.T.O.C.	RED FOOTS TOTAL WATTS	50 WATT. BLUE LAMPS 6" C.T.O.C.	BLUE FOOTS TOTAL WATTS	"B" IN FEET	"F" IN FEET	300 W. WORK LTS.	WATTS PER COLOR	300 W. LAMPS PER COLOR	"B" IN FEET	"F" IN FEET	300 W. WORK LTS.	WATTS PER COLOR	300 W. LAMPS PER COLOR
20	16	64	3200	32	1600	32	1600	16	2	1	1500	5	17	1½	1	1200	4
25	21	84	4200	42	2100	42	2100	19	3	1	1800	6	21	2	1	1500	5
30	25	100	5000	50	2500	50	2500	22	4	1	2100	7	25	2½	1	1800	6
35	30	120	6000	60	3000	60	3000	25	5	1	2400	8	29	3	1	2100	7
40	34	136	6800	68	3400	68	3400	28	6	1	2700	9	33	3½	1	2400	8
45	39	156	7800	78	3900	78	3900	34	5½	1	3300	11	37	4	1	2700	9
50	43	172	8600	86	4300	86	4300	37	6½	1	3600	12	41	4½	1	3000	10
55	48	192	9600	96	4800	96	4800	44	5½	2	4200	14	46	4½	2	3300	11
60	52	208	10400	104	5200	104	5200	47	6½	2	4500	15	50	5	2	3600	12
65	57	228	11400	114	5700	114	5700	53	6	2	5100	17	54	5½	2	3900	13
70	62	248	12400	124	6200	124	6200	59	5½	2	5700	19	58	6	2	4200	14
75	67	268	13400	134	6700	134	6700	62	6½	2	6000	20	62	6½	2	4500	15
80	71	284	14200	142	7100	142	7100	68	6	2	6600	22	66	7	2	4800	16
85	76	304	15200	152	7600	152	7600	74	5½	2	7200	24	74	5½	2	5400	18
90	80	320	16000	160	8000	160	8000	80	5	2	7800	26	78	6	2	5700	19
95	84	336	16800	168	8400	168	8400	83	6	2	8100	27	82	6½	2	6000	20
100	84	336	16800	168	8400	168	8400	86	7	2	8400	28	86	7	2	6300	21

Used with the diagram to the right, this table gives an accurate assembly of dimensions based on proscenium opening. This is standard practice, subject to the variations of individual stages.

SUBJECT:- STANDARD LAYOUT FOOTS, BORDERS, POCKETS & ETC. FOR MAJOR SYSTEM.

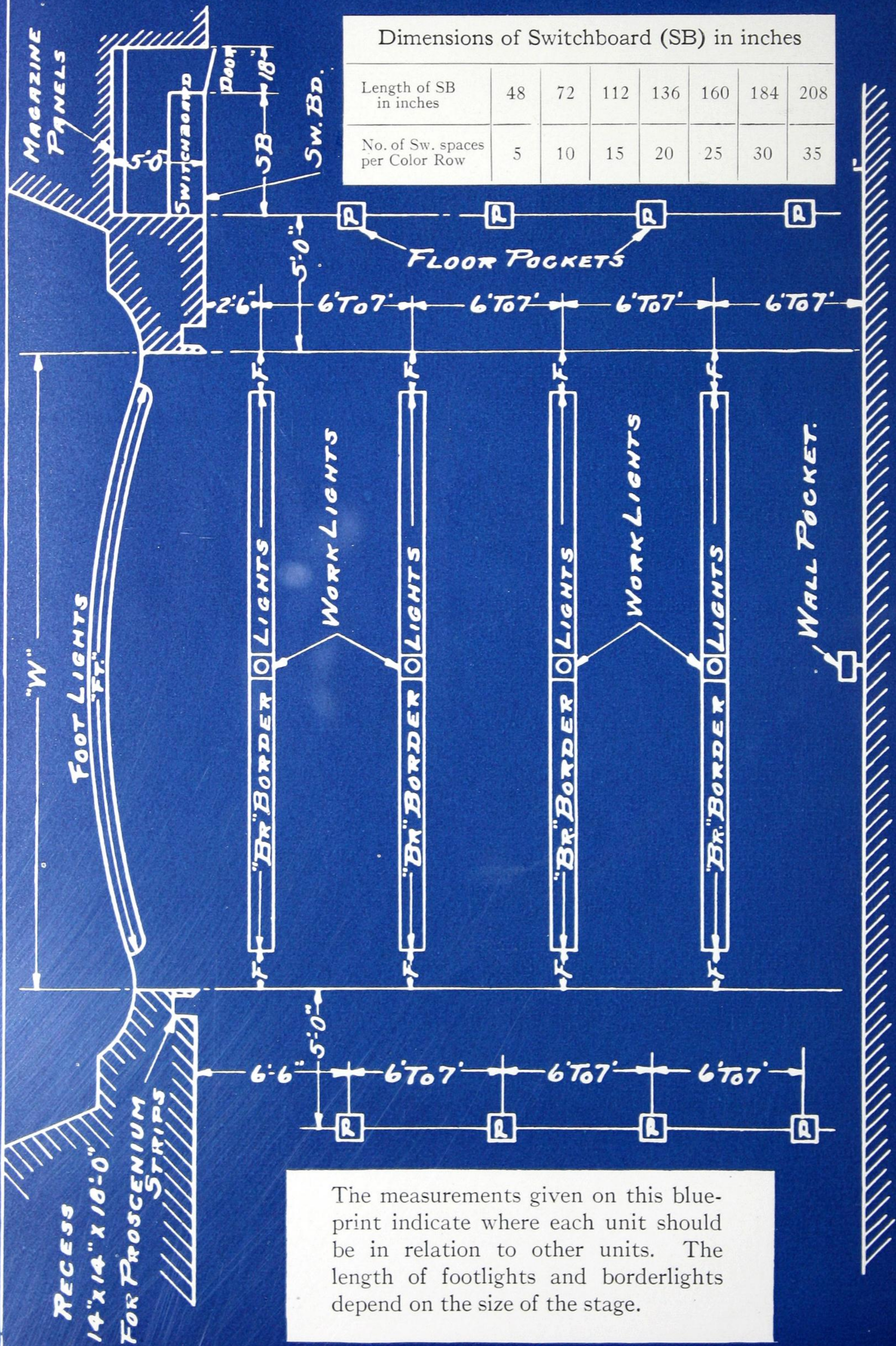


Dimensions of Switchboard (SB) in inches							
Length of SB in inches	48	72	112	136	160	184	208
No. of Sw. spaces per Color Row	5	10	15	20	25	30	35

The measurements given on this blueprint indicate where each unit should be in relation to other units. The length of footlights and borderlights depend on the size of the stage.

SUBJECT:— STANDARD LAYOUT FOOTS, BORDERS, POCKETS & ETC. FOR MAJOR SYSTEM.

Dimensions of Switchboard (SB) in inches							
Length of SB in inches	48	72	112	136	160	184	208
No. of Sw. spaces per Color Row	5	10	15	20	25	30	35



The measurements given on this blue-print indicate where each unit should be in relation to other units. The length of footlights and borderlights depend on the size of the stage.

SWITCHES										FUSES				WIRE SIZES		CIRCUIT NUMBERS		LOCATION OF LIGHTS CONTROL																					
PILOT				TUMBLER			REMOTE			BRANCH & FEED																													
MAINS	COLOR	MAINS	INDIVIDUAL	SINGLE POLE	DOUBLE POLE	THREE WAY	SINGLE POLE	DOUBLE POLE	THREE WAY	MAGAZINE CIRCUITS	CONTROL CIRCUITS	CARTRIDGE	FEEDERS	BRANCH CIRCUITS	FEEDERS	NO. OF CIRCUITS																							
STAGE																																							
			5					5		20		40	12	3-6	7	5a - 5g	WHITE FOOT'S																						
			6					6		20		20	12	2-12	2	6a - 6b	STRIPS																						
			7					7		20		20	12	3-12	2	7a - 7b	BORDER #1																						
	2		8					8		20		20	12	3-12	2	8a - 8b	#2																						
			9				2	9		20	60	20	12	3-12	2	9a - 9b	#3																						
			10					10		20		20	12	3-12	2	10a - 10b	#4																						
			11					11		20		20	12	3-12	4	11a - 11d	INC. POCKETS P.S.																						
			12					12		20		20	12	3-12	4	12a - 12d	O.P.S.																						
RED FOOT'S																																							
			13					13		20		25	12	2-10	3	13a - 13c	STRIPS																						
			14					14		20		20	12	2-12	2	14a - 14b	BORDER #1																						
	3		15					15		20		20	12	3-12	2	15a - 15b	#2																						
			16				3	16		20	60	20	12	3-12	2	16a - 16b	#3																						
			17					17		20		20	12	3-12	2	17a - 17b	#4																						
			18					18		20		20	12	3-12	2	18a - 18b																							
BLUE FOOT'S																																							
			19					19		20		25	12	2-10	3	19a - 19c	STRIPS																						
			20					20		20		20	12	2-12	2	20a - 20b	BORDER #1																						
	4		21					21		20		20	12	3-12	2	21a - 21b	#2																						
			22				4	22		20	60	20	12	3-12	2	22a - 22b	#3																						
			23					23		20		20	12	3-12	2	23a - 23b	#4																						
			24					24		20		20	12	3-12	2	24a - 25b																							
			25					25		50		70	6	3-4	4	25a - 25d	STAGE ARC POCKETS P.S.																						
			26					26		50		70	6	3-4	4	26a - 26d	O.P.S.																						
			27					27		50		35	6	3-8	2	27a - 27b	BALCONY ARCS																						
			28					28		50		35	6	3-8	2	28a - 28b	BRIDGE ARCS																						
AUDITORIUM																																							
			29					29		20		35	14	3-8	6	29a - 29f	WHITE MAIN CEILING COVE																						
			30					30		20		35	14	3-8	6	30a - 30f	RED																						
	31		31					31		20		35	14	3-8	6	31a - 31f	BLUE																						
			32					32		20		50	14	3-6	5	32a - 32e	BALCONY SOFFIT FIXTURE																						
			33					33		10		20	14	3-12	9	33a - 33i	MAIN CEILING																						
										10			14		1	34a	BOX, SIDE & REAR WALL BR.																						
				31						10			14		1	34a	CONSTANT C/L																						
										10			14		1	35a	TRAP ROOM & PASSAGE UNDER																						
										10			14		1	36a	ANIMAL ROOM, PROPERTY RM.																						
										10			14		1	37a	STAGE MGR., MUSICIAN ROOM																						
										10			14		1	38a	DIRECTOR, STAGE HANDS, ELEC																						
				38						10			14		1	38a	WORK LIGHT STRIPS																						
				39a-39b						10			14		2	39a-39b	LIGHTS FRONT & REAR of DL																						
										10			14		1	40a	PROGRAM SIGN																						
				41a-41d						10			14		4	41a-41d	WORK LIGHTS IN BORDERS																						
								42		10			14		1	42a	ATTIC LIGHTS																						
								43		10			14		1	43a	RIGGING LOFT																						
										10			14		6	44a-44f	SPARE																						
				45a-45b						10			14		2	45a-45b	DRESSING ROOMS 5th TIER																						
				46a-46b						10		90	14	3-2	2	46a-46b	4th TIER																						
				47a-47b						10			14		2	47a-47b	3rd TIER																						
				48a-48b						10			14		2	48a-48b	2nd TIER																						
				49a-49b						10			14		2	49a-49b	1st TIER																						
										10			14		1	50a	REMOTE ROOM, GREEN RM. &																						
				51						10			14		1	51a	STAGE ENTRANCE																						
										10			14		1	52a	ELEVATOR, MCH'RY. RM. & ELEC																						
				53						10			14		1	53a	DRESSING ROOM CORRIDOR																						
				54						10			14		1	54a	STAGE WALL BRACKETS																						
				55						10			14		1	55a	WEST ENTRY & STAIR HALL																						
										10			14		1	56a	STAGE DAMPER MAGNETS																						
								57a-57b		10			14		2	57a-57b	ORCHESTRA RECEP.TS. 2d																						
									M.C.	10			14		1	58a	SIGNAL for ORCHESTRA LE																						
										10			14		1	59a	RECEP.TS IN LAUNDRY (3																						
										50			6		1	60a	50 AMP. RECEP.T IN ELEC																						
TOTALS																																							
1	4	29	-	20	4	3	29	-								129	PLUG CIE																						
TOTAL 34										TOTAL 24										TOTAL 32										18 CART. CIE									
1-M.C.-5W.																														147 TOTAL									

SWITCHES										FUSES			WIRE SIZES		CIRCUIT NUMBERS		LOCATION OF LIGHTS CONTROLLED
PILOT			TUMBLER			REMOTE				BRANCH & FEED							
MAINS	COLOR	MAINS	INDIVIDUAL	SINGLE POLE	DOUBLE POLE	THREE WAY	SINGLE POLE	DOUBLE POLE	THREE WAY	MAGAZINE CIRCUITS	CONTROL CIRCUITS	CARTRIDGE FEEDERS	BRANCH CIRCUITS	FEEDERS	NO. OF CIRCUITS		
1			5				5			20		40	12 3-6	7	5a-5g	STAGE WHITE FOOT'S	
			6				6			20		20	12 2-12	2	6a-6b	STRIPS	
			7				7			20		20	12 3-12	2	7a-7b	BORDER #1	
	2		8				8			20		20	12 3-12	2	8a-8b	#2	
			9				9		2	20	60	20	12 3-12	2	9a-9b	#3	
			10				10			20		20	12 3-12	2	10a-10b	#4	
			11				11			20		20	12 3-12	4	11a-11d	INC. POCKETS P.S.	
			12				12			20		20	12 3-12	4	12a-12d	O.P.S.	
			13				13			20		25	12 2-10	3	13a-13c	RED FOOT'S	
			14				14			20		20	12 2-12	2	14a-14b	STRIPS	
	3		15				15			20		20	12 3-12	2	15a-15b	BORDER #1	
			16				16		3	20	60	20	12 3-12	2	16a-16b	#2	
		17				17			20		20	12 3-12	2	17a-17b	#3		
		18				18			20		20	12 3-12	2	18a-18b	#4		
		19				19			20		25	12 2-10	3	19a-19c	BLUE FOOT'S		
		20				20			20		20	12 2-12	2	20a-20b	STRIPS		
4		21				21			20		20	12 3-12	2	21a-21b	BORDER #1		
		22				22		4	20	60	20	12 3-12	2	22a-22b	#2		
		23				23			20		20	12 3-12	2	23a-23b	#3		
		24				24			20		20	12 3-12	2	24a-25b	#4		
		25				25			50		70	6 3-4	4	25a-25d	STAGE ARC POCKETS P.S.		
		26				26			50		70	6 3-4	4	26a-26d	O.P.S.		
		27				27			50		35	6 3-8	2	27a-27b	BALCONY ARCS		
		28				28			50		35	6 3-8	2	28a-28b	BRIDGE ARCS		
		29				29			20		35	14 3-8	6	29a-29f	AUDITORIUM WHITE MAIN CEILING COVE		
		30				30			20		35	14 3-8	6	30a-30f	RED		
31		31				31			20		35	14 3-8	6	31a-31f	BLUE		
		32				32			20		50	14 3-6	5	32a-32a	BALCONY SOFFIT FIXTURES		
		33				33			10		20	14 3-6	5	32a-32a	MAIN CEILING		
									10		20	14 3-12	9	33a-33i	BOX, SIDE & REAR WALL BRACKET		
									10			14	1	34a	CONSTANT CIRC		
									10			14	1	35a	TRAP ROOM & PASSAGE UNDER ST		
									10			14	1	36a	ANIMAL ROOM, PROPERTY ROOM &		
									10			14	1	37a	STAGE MGR. MUSICIAN ROOM & T		
									10			14	1	38a	DIRECTOR, STAGE HANDS, ELECTRIC		
									10			14	1	39a-39b	WORK LIGHT STRIPS		
									10			14	2	40a-40b	LIGHTS FRONT & REAR OF DICT		
									10			14	1	41a	PROGRAM SIGN		
									10			14	4	41a-41d	WORK LIGHTS IN BORDERS 1-2		
									10			14	1	42a	ATTIC LIGHTS		
									10			14	1	43a	RIGGING LOFT		
									10			14	6	44a-44f	SPARE		
									10			14	2	45a-45b	DRESSING ROOMS 5th TIER		
									10	90	14 3-2	2	46a-46b	4th TIER			
									10			14	2	47a-47b	3rd TIER		
									10			14	2	48a-48b	2nd TIER		
									10			14	2	49a-49b	1st TIER		
									10			14	1	50a	REMOTE ROOM, GREEN RM. & ANI		
									10			14	1	51a	STAGE ENTRANCE		
									10			14	1	52a	ELEVATOR, MCH'RY. RM. & ELECT. C.		
									10			14	1	53a	DRESSING ROOM CORRIDORS		
									10			14	1	54a	STAGE WALL BRACKETS		
									10			14	1	55a	WEST ENTRY & STAIR HALL		
									10			14	1	56a	STAGE DAMPER MAGNETS		
									10			14	2	57a-57b	ORCHESTRA RECEPTS. 2		
									10			14	1	58a	SIGNAL for ORCHESTRA LEADER		
									10			14	1	59a	RECEPTS IN LAUNDRY		
									50			6	1	60a	50 AMP. RECEPT. IN ELECTRIC		
									15				1	A	FOR 1st ROW OF INDIVIDUAL PI		
									15				1	B	2nd		
									15	60		2-4	1	C	3rd		
									30				1	E	MASTER PILOT SW.		
									30				1	F	SUB-MASTER PILOT SW.		

1-MC-SW.

[illegible]

Service

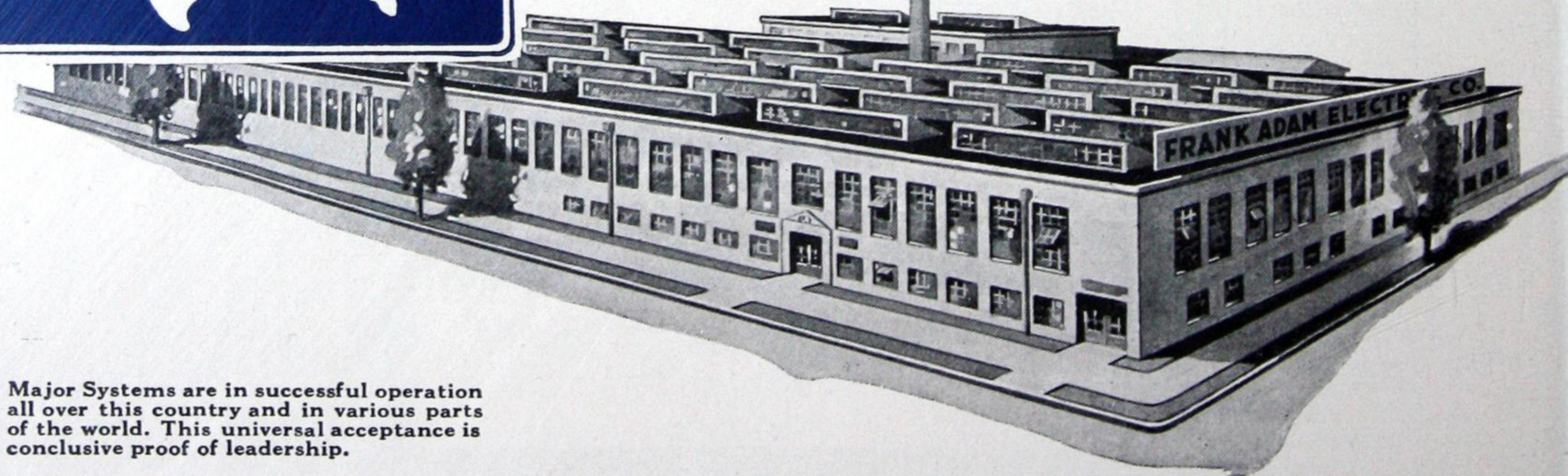
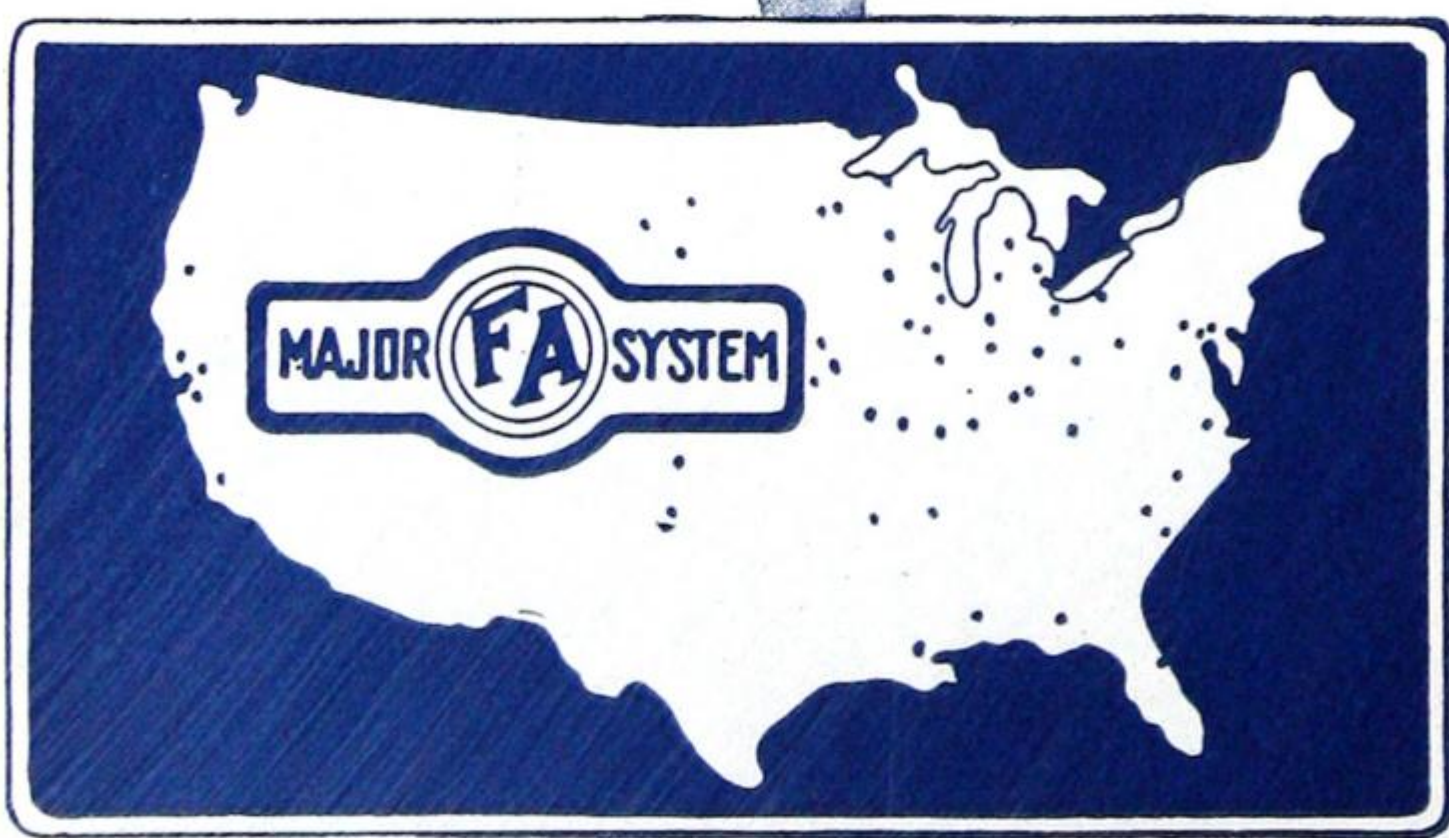
Those who have had experience in theater lighting will appreciate the difficulties in designing a control that will fit the peculiarities of theater work. One almost requires actual theater switchboard operating experience to design one that will be entirely successful, this having been proved, where in many theaters, it was necessary to spend many hundreds of dollars correcting mistakes made by capable electrical engineers who were unfamiliar with theater lighting conditions and requirements. By reason of many years of practical theater work the needs of various types of theater productions are known to the utmost detail by Mr. R. E. Major, who invented the Major System. Not only did his contact with the work bring familiarity but by analyzing the weaknesses of the old systems and planning to eliminate them in an ideal system, this research work broadened his experience to a point of expertness in theater lighting affairs.

The Major Pre-Selective System is a unit proposition and is standardized to the extent that it can be installed anywhere, by any group of electrical workers. However, every theater, auditorium or school building has individual requirements that should be taken into consideration. In order to get full value out of Major System installations, and make the work proceed with the greatest facility, Mr. Major's consulting engineering services are offered. This co-operation with the architects, engineers, contractors and builders of new theater projects is highly valuable.



In addition to Mr. Major's assistance, an efficient staff is maintained at the Frank Adam Electric Co., Manufacturers of the Major System, to handle plan and estimate work.

All this, combined with a modern capacious factory, and the assurance of quality fifty years of successful leadership in the electrical field gives, completes the service back of every Major System and makes doubly sure that wherever installed the Major System will fulfill its every claim of superiority without question.



Major Systems are in successful operation all over this country and in various parts of the world. This universal acceptance is conclusive proof of leadership.

GENERAL SPECIFICATIONS

For the Electric Light and Power Wiring for Theater Buildings for Major System

GENERAL: This contractor shall furnish all labor and material necessary for the complete installation of the electric work as herein specified, and in accordance with the National Electric Code, and the Inspection Bureau having jurisdiction of work installed. This work is also subject to the general conditions in the General Contractor's specifications, and this contractor should examine same before submitting his proposition. Work in this specification to be subject to the inspection and approval of the Architect. This contractor's proposition must be based upon the complete specifications and plans, with all materials as specified. He may, however, make an alternate for other material, with his price, either higher or lower than for the material as specified. No changes will be considered after the contract is let.

All material must be first-class and of standard manufacture, and must bear the label of the Underwriters' Laboratories, if the label service covers that particular line of material. If not, that material must be listed in the list of approved fittings. The Architect reserves the right to demand a sample of any material not particularly specified, for his approval before same is installed. This contractor must guarantee to replace all defective material, and keep the entire system of lighting and power in working order for a period of one year after completion and acceptance of job.

The National Code Standard Rules for electric light and power wiring, current edition, shall be considered a part of these specifications. This contractor must furnish the owner with a certificate from the Inspection Department having jurisdiction on the light and power wiring, the cost of this certificate to be paid for by this contractor.

The workmanship must be of the best quality and no inexperienced or careless workman will be allowed in the building, and this contractor must have a competent man in charge whenever any part of his work is to be done. He must also give due attention to the construction of the building, and see that his work is installed at the proper time to carry out his contract according to the true intent and meaning of the plans and specifications. This contractor must carefully study the general and wiring plans. Also the plumbing and heating plans, and work in harmony with other trades on the building, so as not to interfere with or delay their work. An accurate record must be kept on the contractor's plans, of all changes made in the location of distributing and junction cabinets, outlets and switches, or changes in the distribution of outlets and switches on a circuit that are authorized by the Architect, and must also see that all the changes are made on the plans in the office of the building superintendent.

SCOPE OF THIS WORK: These specifications contemplate the furnishing of all materials and labor required for a complete and high-grade installation of light and power wiring for this building, including feeders, panel boards and switchboards, fuse blocks and fuses, conduits and wires for the distribution of the lighting and power outlets called for on plans and mentioned in these specifications, including all outlet boxes and outlet box covers, receptacles and plates, drop cords, lighting switches, motor switches, service, a stage pilot and remote board, dimmers, borders, foot lights, proscenium strips, exterior illuminating wiring, picture machines, house telephones, conduits for public phones, signal system, and all apparatus shown on plans and mentioned in these specifications to make this installation complete from the service company's feeder to the most remote outlet all ready for the attachment of fixtures and the lamping up of the house. It shall also include connecting up of moving picture machines, spot lights and other arcs to be furnished for picture booth by the owners.

METHOD OF WIRING: This contractor must follow the general building plans for locating the main switch and feeder panel, all of the distributing panels and cabinets, and all electric light and motor outlets, switches and junction boxes, but when these are not shown, or where it is necessary to locate the height from floor, the contractor must apply to the Architect for the necessary information. The feeder diagram is to be followed for the sizes and conduits and cables for feeders and sub-feeders for light and power.

METHOD OF WIRING: All wiring in this building for light, arcs, motors, telephone and signal systems shall be run in iron conduit. All conduits throughout the entire installation shall be run concealed, except the runs on the stage. The conduit will be run in floor construction, attic space, partitions, and when run on brick walls where plaster occurs, contractor will cut the necessary chases in the brick in order to have the conduit covered with plaster as the plaster is put directly on the brick. Conduit runs for outside lights such as fire escape lights, shall be run inside of building and come through to the outside of the building only at the outlets.

It is intended that the conduits in the entire installation shall form a complete raceway from the service board to each of the distributing centers and from the distributing centers to all the lighting and motor outlets. No wires are to be pulled into the conduits until the plastering has been done.

WORKING DRAWINGS: The contractor must furnish a set of prints showing location of all outlets and special apparatus as mentioned in the "Scope of the Work," together with all wiring and conduit system showing sizes of same, and shall also make a design of the service and stage switchboards and the cabinets and panels, furnishing blue prints to the architect and owners for their approval, before starting the work. The detail shop drawing for all switchboards and panel boards must be submitted for the architect's and owners' approval. This is important and will be insisted upon.

CONDUIT: Conduit shall be galvanized iron pipe, of standard manufacture. Conduit will be carefully reamed to remove all burrs and ends of pipe must butt into couplings. All conduits shall be run in long runs and not more than four quarter bends shall be made in one run of conduit. The necessary pull boxes or condulets can be inserted as desired in long runs of conduit to facilitate the pulling of wires. In no case shall a pull box be installed in an inaccessible location. Conduits when entering outlet boxes or cabinet shall be firmly fastened to same by lock-nuts and bushings. Conduits in the entire installation shall be firmly fastened to the structure of the building.

GROUNDING: The conduit shall be grounded in an approved manner in at least two places.

WIRE: Wire used in this installation shall consist of tinned copper of 98 per cent conductivity, to have a rubber insulation around the conductor of a thickness as given in the latest requirements of the City Electrical Inspection Department, or the "National Code." The insulation is to have a double braid covering, for all wires larger than No. 8. Wire of the following companies will be acceptable for use in the work: G. E. Red Core, Simplex Wire & Cable Co., American Steel & Wire Co., Standard Underground Cable Co., Habirshaw Wire Co.

SIZE OF WIRES: The size of wire for distributing circuits for all purposes and main feeders shall be not less than the size given in the rule book of the Electrical Inspection Department, or "National Code," based on the entire load being in operation at one time.

On distributing circuits, more than one circuit can be run in one run of conduit, as described by the code rules. On border lights, proscenium strips, foot-lights, exterior lighting and coves, No. 12 wire is to be used.

CUTTING: Where it is necessary to cut brick or tile walls in order to conceal conduits behind plaster, same must be done in a careful manner. All ceiling outlets shall have outlet boxes built into floor slabs. Where it is necessary to punch holes through floors, same must be done from underneath. All damage done to floors, ceilings, walls or partitions must be carefully repaired by this contractor.

OUTLETS: Each switch, light, receptacle and other outlets through the building shall be provided with a standard outlet box of heavy metal. Outlet boxes inside of building shall be of the knockout type and shall be set in such a manner as to be flush with the finished plaster. All outlet boxes outside of building shall be of the marine water-proof type Crouse Hinds conduit

with rubber gaskets. All outlet boxes shall have only the holes necessary to accommodate the conduits entering same. Outlet boxes in all cases shall be firmly fastened to the structure of the building.

DETAIL LOCATION OF OUTLETS: The location of the various outlets shown on the plans and mentioned in the specifications are only approximate and in order that all outlets shall come in proper relation to panels, pilasters, columns, etc., contractor shall study the details of these spaces, obtaining the necessary information from the ornamental plasterer and other contractors on the building, so as to make all the electrical work fit the work of the other contractors. In all cases, outlet boxes shall come in the center of the decorating panels where same occur so as to avoid any changing of outlets or decorating effects. In case any of this contractor's work is not properly placed to the approval of the architect, this contractor shall move same without additional expense to the owners.

All ceiling and bracket outlets for the attachment of fixtures shall be equipped with fixture supports firmly fastened to the outlet boxes and the structure of the building.

OUTLET ACCESSORIES: Where called for in these specifications for equipping outlets with sockets, switches, etc., contractor shall use only association made devices. For drop cords contractor shall furnish an Edison Key Socket, Loxon Lamp guard and reinforced cable installing same in the outlet box cover having a bushed opening. Where flush switches are called for, contractor shall use G. E. Tumbler. Where flush receptacles are called for, Cutler-Hammer's No. 7711, or equal, shall be used. Furnish steel covered receptacles P. S. No. 443, or equal for all light outlets except where fixtures or drop lights are specified. Some of the outlets have special equipments and are mentioned further in these specifications. Lamps will be furnished by others, but lamping up and coloring of lamps shall be included in the contract.

FUSES: The contractor shall furnish a complete set of fuses for all fuse openings in the building. Plug fuses shall be used for lighting branch circuits of 30 ampere or less, and cartridge fuses for all mains and sub-mains and all circuits over 30 amperes. All N. E. C. fuses be Buss or D & W non-refillable, except those on power circuits and they shall be National Multiphase Renewable fuses.

DISTRIBUTION OF WIRING: The wire and conduit shall be run from cabinet to cabinet in the proper manner forming a chain of distribution, starting from the point of service entrance to the main distribution cabinet branching out from that point to all of the cabinets following. From the cabinets and switchboards, the wiring shall be run to the final points of distribution consisting of all light and power outlets, arc receptacles, sign outlets, etc. In distributing the wire to the lighting outlets from the above fuse cabinets, contractor shall group the outlets for such circuits in a consistent manner, placing not more than twelve (12) lights or 660 watts on one circuit. For the borders, footlights and proscenium strips all trough and cove lighting, 1320 watts may be placed on one circuit.

CONTROL OF CIRCUITS: The lights in general spaces throughout the building shall be controlled from the various fuse centers either by master switches or separate circuit switches as described later. In some of the rooms, lights are to be controlled by flush switches which are to be placed so as to be visible from the light being operated. The location of the switches is as shown on plans.

SYSTEMS AND SERVICE CONNECTIONS: The contractor before estimating on this work must see the light and power company and see what kind of service connections will be made in each of the three services specified. The successful bidder must get all of his information from the light and power company, see that all of his conduits, cables and all apparatus are designed and constructed for the service that the light and power company will furnish.

MAIN SERVICE CONNECTIONS: There must be one separate service for all of the illumination and fans in the building, excepting exit and emergency lights, another service to take care of all the exits and emergency lights, and third, for power service to take care of power in the building. All three separate services will enter the building where marked on plans, each service to be brought through the wall in conduit, and the con-

duit fitted with special conduit for out-door service. The cable must be at least three feet beyond the conduit. The feeder diagram will show the main and sub-feeders capacity and sizes of conduit and the number of branches for each panelboard.

MAIN SWITCHBOARDS: Where located on plans this contractor is to furnish, set up and connect up complete on standard design and construction Frank Adam Electric Company service and feeder switchboard.

All switches to be FA standard back connection knife switches with NEC Fuse connections and back connected with rectangular copper bus bar.

The main service switch and all feeder switches must be full capacity of cables as shown on feeder diagram, and meter loop connections must be left between service switches and bus bar for connecting in meter for each service.

The service and feeder switches are to be mounted on not less than 1½" slate, finished dead black, and with number of panels necessary to take switches without crowding.

This switchboard must be enclosed in an FA standard design and construction steel cabinet with doors on both the front and rear side, and having a junction box at the top of at least 10 inches high and of the full depth and length of the cabinet, and on the front of this junction box must be arranged bushed hole to bring through meter loops, and meter board furnished for each service meter.

PANELBOARDS AND CABINETS: At each distributing center for branch lighting circuits as located on plans, and about 4' 6" from floor to center, install complete a T-P safety type panel board and cabinet (FA cut No. TP3L) made by the Frank Adam Electric Co. Each panel board for general illumination must be equipped with 125-250 V. bus bar with lug connection to feeders and with FA D. P. tumbler type 30 Amp. 250 V. switch with N. E. C. plug type fuse connections. The cabinet front must be flush type finished in 2 coats of gray lead. (NOTE: The final finish will be made when walls are painted.) Panel boards are to be equipped with two circuit branches in addition to the number of circuits shown on wiring plans.

The panel boards and cabinets placed in stores must be furnished as above, also with safety main switch with main fuse and meter loop connections, with front extended at top with bushed holes for meter loops. Box office panel board shall be in two sections, one section to be the T-P safety type controlling by individual branch circuit switches the lights at entrance, lobby and other public lights in front of house, the second section to have fuse connection branches only, controlled by safety type main switch, and feeding all emergency and exit light circuits.

MOTORS: All motors and starting devices will be furnished and delivered to the building by others, but this contractor shall receive and set same in place and make all necessary electrical connections. Provide a Trumbull or equal safety type externally operated switch for each motor. This contractor shall include in his bid all necessary labor and material for connecting the motors complete ready to run.

METERING: Provision shall be made for the following meters: 1—One for total lighting load. 2—One for the total power. 3—One for the emergency and exit lighting load.

This contractor will bring out cables through required meter fittings and provide neat meter board painted black for the accommodation of meters, which will be furnished by others. The contractor shall confer with the representative of the power company and the architect before deciding on the method of arranging the meters.

MAJOR SYSTEM STAGE SWITCHBOARD. The contractor is to furnish and install complete a Major Pre-selective Pilot Board and Dimmer System as manufactured by the Frank Adam Electric Company, St. Louis, Mo., consisting of a pilot-board and dimmer bank located on the stage as indicated on plans, and a remote-board in the basement under stage as shown.

The combination pilot-board and dimmers shall be made up of the number of switch units and dimmers as per schedule, sheet No. of drawings, mounted on an angle-iron frame enclosed in a steel cabinet made of No. 10 U. S. Gauge steel. This cabinet shall be provided with a four-inch mat of No. 10 steel. The upper part of the mat shall contain 3 Brookins Aislelites for lighting the pilot-board. These lights shall be controlled by a tumbler switch on the pilot-board. The lower part of the mat shall be provided with a 3 wire flush receptacle (Bryant No. 425) complete with plug attached to 75 feet of 3-conductor No. 14 stage cable with a No. 2642 Bryant Momentary contact push

switch on the other end of the cable, so that it will control any or all switches on the entire pilot-board, except those for the auditorium lights. There shall be two No. 2642 Bryant Momentary contact push switches, one located in the foyer (as indicated on the plans) and the other one on the front wall of the operating booth between look-outs. These switches shall be wired in multiple and connected to the house main by 3 No. 14 wires, to control all or any part of the lights in auditorium. Provide the necessary number of 7 gang plates and switches to provide a G. E. flush tumbler switch as per schedule under tumbler switches on Pilot Board. Provide seven spare tumbler switches and plate on pilot-board. The tumbler switch plates shall be the same gauge and finish as the pilot-switch plates. Each pilot-switch, except the mains, shall be provided with a pilot-light and color cap corresponding with the colors of the lights controlled by respective pilot switch. Each pilot switch shall be provided with etched copper name plate showing the circuit controlled.

MAJOR SYSTEM REMOTE BOARD: The remote board equipment, which is to be located in a room beneath the pilot board, shall consist of an assembly of magnetic clapper type switches as per schedule sheet, No. of plan. They shall be of not less than 100 ampere capacity, although a single remote switch may be used to control a lesser load.

Each remote switch shall be mounted on a moulded insulated base with holes provided for 30, 60 and 100 amp. N. E. C. fuse connections so that it will be possible to change fuse capacity to take care of future increases in the load. Each remote switch shall have back connected studs, and be so connected to the main bus on the rear of the board that both the switch and the fuses will be dead when the switch is open. The remote board shall be made up of an assembly of these remote switches mounted on an angle iron frame. The entire board shall be provided with terminal bus connections carried to the top of the board. Each bus from the remote switch studs shall be 100 amp. capacity and shall be drilled for each of the three different size fuse connections. There shall be a 1" fibre tube behind each vertical row of remote switches with holes for each remote switch so that the control wiring can be run in these tubes and out to each switch. Provide an 18"x18" pull box the full length of the remote board and over same. This pull box to have a slate bottom with separate holes for each sub-feeder wire, and separate holes for each fibre tube containing control wires.

MAGAZINE PANEL: The magazine panel shall be made up with required number of branches as per schedule on sheet No. There shall be the required number of F-A safety type composition panels having Edison plug fuse branches for all circuits. Each circuit shall be numbered as per a schedule to be furnished by the wiring contractor. The panels shall be of the polarity type with circuit numbers, of white letters on black buttons. The main bus shall be split so that each dimmer will feed a special section of bus. Provide lugs for each break in the bus. The bus for each section shall be figured on 10 ampere per branch circuit. All bus to be covered by the composition sections.

Provide and attach etched copper name plates as directed on the steel strips directly opposite each separate section of bus, to indicate the location of the lights controlled by that particular section of bus. The contractor shall furnish detail shop drawings of these panels and cabinets for the architect's approval before proceeding with the work.

DIMMERS: This contractor shall furnish and install one bank of Cutler-Hammer interlocking 110 step theatre dimmers built in combination with the pilot board, with wattages as listed in schedule. The dimmers shall be for intermittent duty and each lever is to have an indicator attachment. Provide levers, master levers, grand master levers or slow motion wheel drive as shown in schedule.

FOOTLIGHTS: Are to be "Major" double row type, as shown on plans. Connections between the footlight trough and pull box are to be made with Greenfield flexible conduit, so that

the trough may be removed for cleaning without disturbing any connections. The lights shall be wired on alternate circuits, all the way across the trough. Use No. 12 D. B. R. C. wire for the wiring of the footlights, number of lights, shown in schedule, circuits, etc.

BORDER LIGHTS: This contractor shall furnish complete "Majorlite" border lights, number, length, wattage, colors, etc., as shown on plans and in schedule.

STAGE POCKETS: Where shown on plans the contractor shall furnish and install Major stage pockets, complete with plugs. These pockets to be set flush in the stage. Feeders to each arc receptacle shall be No. 6 wire and to each inc. receptacle shall be No. 12. Note: Each receptacle must be on a separate circuit.

PICTURE BOOTH: Provide a safety switch in Converter Room fed by 3-No. 6 wires from main power service cabinet, in a 1 1/4" conduit, to feed the motor generator. The motor generator set and panel will be delivered to the building by the owners, but this contractor shall receive same, set it in place, and make all necessary electrical connections. From the panel furnished with motor generator set the contractor shall run an inch and a quarter conduit and 2-No. 2 wires to each picture machine, and to the stereopticon.

These conduits shall run through the concrete floor and then up 24 inches from the front wall of the booth on the center of the projection opening. Furnish type "A" conduit with 2 hole cover located 3" above the floor. The No. 2 wires in each conduit shall be long enough to extend to switch terminals on machines without splicing. At the same location contractor shall install a half inch conduit with two No. 14 wires for the motors on the picture machines, these conduits to run to the 4 circuit A. C. Cabinet on wall of booth.

From this cabinet on the wall of the booth for booth lights and motors on picture machines and rewind motor, this contractor shall install a flush push switch controlling a flush receptacle at the location of the rewind shelf for the rewind motor. From this same cabinet the contractor shall install through a push switch at the door controlling drop cord outlets, located over the head of each machine, and one over the rewind shelf. These drop cords to be equipped with porcelain sockets and guards with cords long enough to reach within 3 feet of the floor. Install two No. 4 wires in a 1 1/4" conduit run from the motor generator panel through the floor of the booth to a point on the front wall of the booth 18 inches above the floor under the spotlight opening. Furnish a 2-hole type "A" conduit. The owners will deliver to the building two picture machines, one stereopticon, and one spotlight. The contractor shall receive same, set them in place and make all necessary electrical connections.

TEMPORARY LIGHTING: This contractor shall install and maintain temporary lighting service and wiring for 40-60 watt lamps and 3-1000 watt lamps. The 3-1000 watt lamps shall be located as follows: One over stage. Two over auditorium as directed. The 40-60 watt lamps shall be distributed about the building as directed. This temporary lighting shall be moved as often as required by the various trades and as directed by the architect's superintendent. The installation shall be made and maintained in accordance with rules and Union regulations existing or enacted before the completion of the buildings. The temporary lighting must be turned on at 8:00 A. M. and must not be turned off before 4:30 P. M. The owners will furnish lamps and current for all temporary lighting.

CALL AND RETURN SIGNAL: Install a 1/2" conduit and 3-No. 14 wires for a call and return system from the operator's booth to the stage switchboard. Furnish buzzers, buttons, and bell ringing transformers and connect the system complete.



Please Do Not Destroy This Book

Reprints of these specifications and blue prints will be furnished upon request. Bulletin No. 28

Frank Adam Electric Co.

3649 BELL AVENUE

ST. LOUIS, MO.

Frank Adam

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